RAILROAD GAZETTE

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# Contributions.

### The Track of the Quincy Railroad.

*Massachusetts Institute of Technology,*
BOSTON, Mass., Feb. 3, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Doubtless some of your readers still remember the discussion between Mr. George W. Blodgett, Mr. W. Hasell Wilson and Mr. Foster Crowell, published in your columns last October, concerning the stone ties of the historic Quincy Railroad There was some uncertainty as to whether the ties were longitudinal or transverse. Permit me to offer the photograph herewith as a fitting close to that discussion. The photograph was taken by me in the year 1885. In the foreground is one of Mr. Blodgett's "city edge stones" (of which there are many others not in our view) and beyond are the granite sleepers of Mr. Wilson. JAMES H. STANWOOD.

### A Rumored Change of Line.

LOS ANGELES, Cal., Jan. 20, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is not often that a through railroad proposes a change and abandonment of a portion of its line almost equal to the distance from Albany to Buffalo. Such a proposal the Southern Pacific is now considering in Southern Arizona. This company in its original location decided for the shortest routes across the sun-parched deserts of Arizona. Deserts they were in truth, and the railroad wisely decided that deserts they would remain to the end of time, and, save for the subjugation of the murderous Apache, nothing good could ever be hoped from them. In the last few years miners and cowboys have turned agriculturists. Mountain streams have been dammed, and supposed dry river beds have been made to yield up water, and then, taking example from the Pueblo Indians, the water has been led around in great irrigating ditches. The results have surprised not only Arizonians, but the railroad corporation as well, and a quantity of freight and produce is passing daily out of the Salt River Valley near the rapidly growing city of Phœnix. The railroad now finds that its location was on the wrong side of the desert, that population, development and gardens and oranges groves which vie with California, are about 30 miles too far from its line; it therefore contemplates the abandonment of the present line from Bowie station to Gila Bend, a distance of 240 miles, and a change of route so that Southern Pacific trains will run through Globe goldfield, Florence and Phœnix to Gila Bend.

A surveying party will be started over the proposed route late in the spring, or as soon as the snow is off the mountains. V.

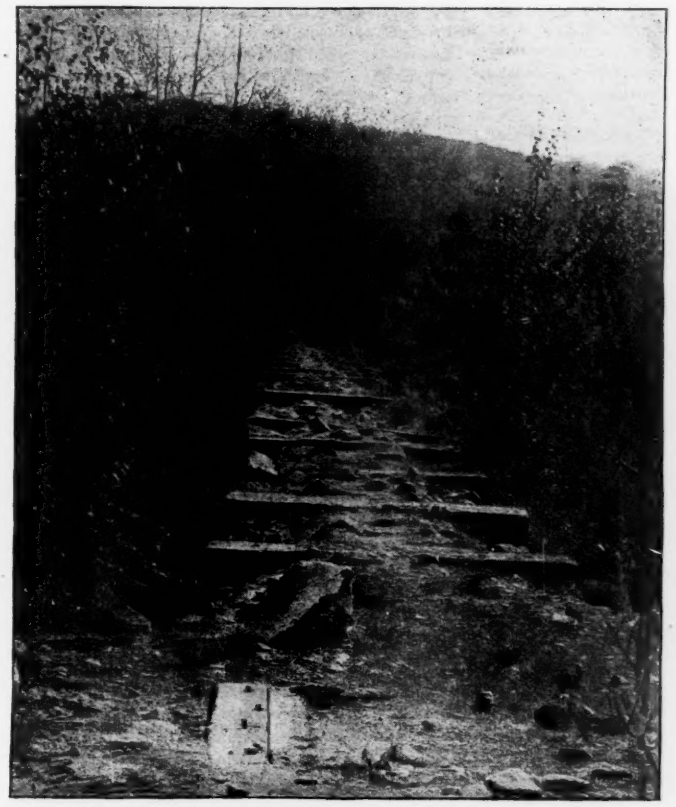
[The Chief Engineer of the Southern Pacific Company writes that our letter of inquiry is the first that he has heard of any intention on the part of that company to make surveys between Bowie Station and Gila Bend We publish our correspondent's letter, therefore, not because it gives information as to the plans of the Southern Pacific, but because of its other interest. Not the least interesting part of it is the illustration of how railroad news is made and of how vigilant the editor must be who wants to tell only the truth.—EDITOR RAILROAD GAZETTE.]

### Telegraph Office Details.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In managing a small railroad station, it frequently becomes incumbent upon the operator, who, as a rule, is also the station agent, to check the baggage, attend the trains, sell tickets, check freight, carry the mail to and from the post office, build fires, sweep waiting rooms, offices and platform, light and take care of switch lamps, station lights, and in fact be a general utility man. Under such circumstances, it is not surprising that some of the minor details of efficient telegraph practice are often slighted or entirely overlooked at the smaller points. It is a simple problem, in which time is the prime factor. If the agent or operator has a little spare time after performing his multiplicity of duties, he should, by force of habit in detail work, watch the working of the telegraph, and set a pace for those more fortunate as to time, but lacking in energy and desire to excel. I allude particularly to the natural inclination of some people to keep their surroundings neat and tidy. Some look upon the labor of cleaning up as a tiresome hardship, while others, systematic and orderly in all things, look upon it as a pleasure. The latter class are the ones not overlooked by their superiors. Even with the busy station agent, there is always time for a little brushing up, and that time should not be wasted sitting upon a baggage truck whittling upon the platform, like unto the typical "Yankee," only to add to his own labor in cleaning up the chaff, but should be used in cleaning up the local surroundings of his office.

Being an operator, he must know that the electric energy, which is supplied to work his instruments, like the engine moving a train, must have a clear track, or wreck and delay is the result. Take a rail out of the



A View on the Line of the First Railroad Built in the United States.

main track of a road and it would be very difficult for a train to pass over the opening; likewise, if the wires are loose in the binding posts of the relay, cut-out, key, or elsewhere; if connections are poorly made, if dirt is allowed to accumulate between the points of contact, the rail is out of the circuit and the flow of electric energy upon the wires is wrecked or delayed. If the agent was told that there was a rail out of the main track, he would undoubtedly take steps to see that it was properly replaced so as not to interfere with the operation of trains. The same interest should be taken in the operation of the telegraph circuits, and all obstructions removed. It takes but a moment for the operator to examine the points of contact between the wires and his office instruments, to prevent uninsulated wires from coming in contact with foreign substances that may deflect the energy from the circuits; see that the key is clean and free from dirt; remove the dust from the relay armature and plate, and make tight all binding posts. When this is properly done, the operator will see an improvement in the working of his main line instruments.

I have offered an apology for the operator performing a multiplicity of duties, but I cannot do it for the man in the better or larger class of offices, where the operator has only the telegraphing to look after, or, perhaps the additional labor of selling tickets at train time. A dirty condition in such an office is inexcusable, and evidences lack of tidiness and of a proper interest in the business. The fact that the operator considers that he is only paid for doing the telegraphing should cut no figure. He is paid to look after the welfare of his employer, and the latter's interests are best subserved when the equipment is kept in such shape as will render the best service from the energy supplied from the batteries. The local operator at a small station is too apt to feel that his part in the railroad system is not prominent enough to bring him into notice before those in authority, and this feeling too often lets him get into untidy and careless ways. Aside from the desire to do every duty, however humble, in the best possible manner, which should be the aim of every self-respecting person, there should be the knowledge that the work of each individual is closely watched, and if well done, appreciated. Many of the most able railroad managers of to-day were originally telegraph operators on small salary, and there are those now "pounding brass" who will make their mark years hence in the railroad world. GENERAL MANAGER.

### The Position of Freight-Car Seals.

*New York, New Haven & Hartford R. R. Co.,*
SPRINGFIELD, Mass , Feb. 8, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It can be demonstrated that the seals on a freight-car are quite frequently examined, read and noted from 20 to 25 times from the time they are first attached until the car reaches its final destination. Oftentimes it is no easy matter to read these seals. Some are very small, many quite illegible, many out of reach. But much importance is given to correct notation regarding the seal that the different reports may be uniform.

In the courts, for instance, if the various reports of the same seal differ, the value of the seal itself becomes much impaired and is perhaps worse than useless. It would appear that no matter how difficult the task of procuring the seal number may be, it should be done in all cases correctly. Nevertheless, it is not uncommon for the seal to be attached to door-fastenings 8, and even 9, ft. from the ground (which is generally considerably below the top of the rail), and fully as often as otherwise, from 6 to 7 ft. from the ground. It does not follow that the tallest men make the best conductors or number-takers, nor can these men go around carrying ladders and do their multifarious work. It is just as essential for them to be quick as to be exact. The same applies in great measure to the sealers, who must get around rapidly or get left in the lurch. The sealer's work is doubled, indeed, through these high doors. Often he has to walk a mile to seal one car, because when the car was near at hand his ladder or box was not handy. But as sealing cars is largely the sealers' sole task, he has not the difficulties that a good conductor labors under, who has so many other things to think of. He must, perforce, too often note the seal number as "indefinite," "illegible," or resort to a little shrewd guesswork. Especially at night is the disadvantage of high doors most apparent.

Western railroad corporations, characteristically to the front, seldom nowadays place the car-door hasp over 5½ ft. from the ground; but on the other hand, the Canadian roads and those of Northern New England seldom build with the door fastenings within easy reach. And such cars are not so apt to be sealed properly. Hundreds are "blocked" at the smaller stations, because the hasp is beyond the reach of the sealer. I have sealed cars for over a dozen years, but have never seen or heard a good reason given for putting the hasps, and consequently the seals so high on a door that the sealer must use a ladder in order to seal them. The reason advanced that it puts them out of the way of tramps and thieves might as well apply to house locks. But this consideration appears to have no weight with the western companies, with their vast array of cars, nor with the New York Central and other great roads. For, if the fastenings and seals are out of the way of tramps, they are also out of the reach of a small army of employees who are paid to look carefully to them.

JOHN A. DEARDEN.

### Increased Heating Surface in Locomotives.

NEW YORK, Feb. 10, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Replying to the comments in your issue of the 7th inst. on my communication on the subject of "Increased Heating Surface in Locomotives" (published in the *Railroad Gazette* of Jan. 31, with a corrected table in your issue of Feb. 7), I beg to state that Mr. J. Snowden Bell has misunderstood me in supposing that I ignore the advantage of an increase in the size of the firebox, if this is practicable under existing conditions.

What I was dilating upon was the loss of heat in loco-

motives with plain tubes; but unless the heat generated in the firebox can be utilized to a greater extent than it is at present, Mr. Bell will pardon me for saying that I really cannot see how the enlargement of the firebox is going to mend matters very much. Of course every little helps, but it seems to me we should not lose sight of the much greater advantage to be derived from making the tubes do their part of the work, and this they have never done for the reasons named in my communication of Jan. 31, and can never be made to do while the products of combustion in the firebox pass through them as they do now, so largely unabsorbed where the internal surface of the tube is smooth.

Suppose that it would be entirely safe to estimate the square feet of heating surface in the tubes at *nine times* that of the firebox, in the average locomotive boiler. Now, why should we neglect to make some effort to utilize to a greater extent than we do at present, *nine-tenths* of the heating surface in a locomotive or any other boiler, and concentrate our entire attention upon the firebox which represents only *one-tenth* part of it? This is practically what we have been doing, and wherein, in my judgment, we have been making a mistake which we cannot too speedily make an attempt to rectify. Surely it is worth an experiment on the part of every railroad in this country to ascertain definitely for itself whether this mistake has or has not been made. The French railroads have been experimenting for years, and one of them, at least, "exhaustively," viz., the Paris, Lyons & Mediterranean, and they say unqualifiedly that the mis take has been made.

If the object in tubing a boiler is to get "heat-absorbing surface," as I think we are all agreed it is, surely that tube which has most of this surface will take up and throw out the most heat, and consequently evaporate the most water. And lest some of your readers may possibly think that if more heat *is* absorbed by the Serve ribbed tube it cannot be distributed or thrown out by it, I will state that it is a practically employed engineering rule, that the water surface of tubes gives out heat fully 30 times as quickly as the internal surface absorbs it, under the usual conditions in boilers.

In reply to Mr. John Christiansen, I beg to state that I do not know of any water tubular boilers in actual service in locomotives. I believe some experiments have been made in this direction, and am informed the results have not been satisfactory.

C. W. Whitney.

## The North River Water Front.

A few months ago a Board of Consulting Engineers was appointed by the Commissioners of the Department of Docks, New York City, to investigate the designs and methods of the actual work done on the water front, to examine into the improvements proposed, and to make suggestions as to possible modifications of the plans. This Board of Engineers consisted of Gen. Thomas Lincoln Casey, late Chief of Engineers U. S. Army; Mr. George S. Morison and Prof. W. H. Burr, all distinguished memb rs of the American Society of Civil Engineers. Their report was made public last Saturday. It is a document so important in itself, and it deals with a subject of such novelty and magnitude, that we shall publish it in full. About half of the report appea:s in this issue; the rest will be published next week. What follows is verbatim from the report, except that we have taken the liberty to supply side-heads for the convenience of the reader.

The Board of Consulting Engineers, appointed in pursuance of the resolution of Nov. 11, 1895, respectfully submits the following report, in response to the following resolutions of Dec. 12, 1895, to wit:

*Resolved*, That the Board of Consulting Engineers be and is hereby requested to review the improvements of the waterfront, and the plans therefor; and further.

*Resolved*, That the said board be and h reby is requested to submit, with its report, such suggestions as it may deem proper for the betterment of such plans, with the view of securing a larger usefulness of the waterfront of the City of New York.

The subjects covered by these resolutions are of such magnitude and general character that this board has thought best to review the general arrangement of docks in the City of New York, and to consider more in detail the features which it thinks of paramount importance, leaving other matters to be considered in reply to such further communications as your honorable body may see fit to make.

The water front of New York City is naturally divided into three grand divisions: The North River front, the East River front and the Harlem River. The conditions of these three rivers are so widely different that they can best be treated separately, the different divisions bearing little relation to one another, except as each relieves the other two from the class of traffic which it can accommodate.

Of these the North River is by far the most important, and the only one which is adapted to the accommodation of the largest class of vessels. The East River has always been the headquarters of sailing vessels, and it possesses advantages for the construction of warehouses and in convenience of access to the Sound ports, which may become very important. The Harlem River, with its narrow channel and frequent drawbridge obstructions, is not available for the larger class of craft, though it is very useful for distributing building material, fuel and other supplies which may be wanted locally in the neighboring parts of the city.

The North River, on the other hand, with a width of over 3,000 ft. between pier-head lines, with abundant depth, a straight course, and an unobstructed connection with the lower bay, affords ample room to handle every class of vessel. The current of the North River is less rapid and more regular than that of the East River. The only objection that has been raised to this river is that large ice fields have been known to come down it, which have sometimes been dangerous to piers and the lighter class of craft; these ice fields, however, are not such as to endanger ocean steamers, and give but little trouble to well constructed piers, and should it ever be found necessary they can be broken up by ice boats of the class used in the Detroit River, and all danger from this source removed; of course ice will at times obstruct the entrance to slips and cause delays. Nothing but a change of climate can avoid this difficulty; but it is less on the North River than on any other portion of the New York water front. In brief, the North River is so much better adapted than any other part of the harbor to modern steamship service, that so long as there is space on this river Atlantic steamers will not go elsewhere; if they cannot be accommodated on the New York side they will go to the Jersey side; if they cannot get accommodation on either side they will probably seek other ports.

Foreign commerce is now dependent on steamship service. The city of New York has been built up and lives on foreign commerce; as the prosperity of the city depends on this foreign commerce more than on anything else, the development of this commerce should be given preference over anything else; this means that the provision of the best possible facilities for ocean steamers must be the leading idea in considering the best plans for the New York dock system.

For this reason the Board of Consulting Engineers has thought it best to confine this report to the North River and especially to that portion of the North River which is now available for steamship service, or from the Battery to West Fifty-ninth street.

*Characteristics of the Shore*.—The physical characteristics of the North River must regulate the class of construction which can be put there. At the Battery, rock is found at comparatively moderate depths (less than 50 ft ) below mean high water, and the depth to rock does not change materially below Barclay street; above Barclay street the rock becomes deeper, but continues at a depth not far from 80 ft. at the bulkhead line and somewhat less on the pierhead line to Leroy street; the depth there increases; it is 124 ft. at Christopher street, and nearly 200 ft. at Fourteenth street, and these extreme depths continue to Thirty-fourth street; above Thirty-fourth street the rock rises rapidly on the bulkhead line, but continues very deep on the pierhead line. Over this rock is a deposit which, though it contains in some places fairly good sand, may generally be described as mud; it has, practically, no carrying capacity, and any weight resting on its surface sinks into it at once. Any construction built along the North River, from Barclay street to Thirty-fourth street, must be built in this mud; it is entirely a case of mud flotation; the structures can be sustained only by making them a part of the mud. Above Thirty-fourth street the same condition may be said to exist with the piers, though better foundations can be found for the bulkhead wall.

*Mud Flotation*.—It becomes important to consider what the real nature of mud flotation is. A pile driven into mud is surrounded by the mud, which adheres and sticks to its surface; the pile becomes, as it were, a part of the mud, and it stands there; in this way a single pile can be put down so that it stands practically firmly. On the other hand, though the pile cannot be moved in the mud, the mud itself is a soft, compressible material, and the pile foundation can bear no more than the mass of mud; the piles cannot settle in the mud, but they cannot help settling with the mud. If, therefore, a weight is put on the mass of piles in a pier exceeding that which the mud itself can bear, the mud and structure will go down together as a whole. This is the invariable experience with structures built in this way. The movement being that of a large mass, is slow, but it is no less real, and the fact that a pier carrying 500 lbs. per foot is supported by 1,000 piles is no evidence that a pier of equal area supported by 2,000 piles would not settle with a weight of 1,000 lbs. per square foot. The ultimate capacity is not measured by the supporting power of the separate piles, but by the supporting power of the medium in which the piles are imbedded.

Below Barclay street the foundations for both piers and bulkheads can be carried to rock, and piers of indefinite capacity can be built. Above Fiftieth street there is a short reach where the depth to rock is very small, but the rock here has a rapid slope, and, while the bulkhead wall can be built on rock without trouble, the piers must be floated in mud.

*The Bulkhead Walls*.—The general arrangement, which dates back to the plan of 1871, provides for a bulkhead wall about 180 ft. west of the old crib bulkheads (the latter having been very irregular in shape), so situated as to give a marginal street (including the old street) 250 ft. wide. This bulkhead wall is a permanent masonry construction. Outside of this bulkhead wall are projecting piers of varying lengths, reaching from the bulkhead line to the pierhead line. Between West Eleventh and West Fourteenth streets the bulkhead line of 1871 was so near the pierhead line as to virtually eliminate the piers.

As the bulkhead wall is a retaining wall, which has to resist the horizontal thrust of the earth-filling behind it, and both that e rth-filling and the wall itself are floated in mud, the problem of providing a permanent construction becomes a very unusual one. To build a retaining wall on a solid foundation is a simple problem. To build a wall to carry vertical weight only, on a soft foundation, is more difficult. To float a wall in mud, when that wall must also take a horizontal thrust, is a problem which can only be solved by care and experience, no formula or mathematical rules being available. The wall, as now built, is a satisfactory solution of this problem. Your Board believes it to be a unique construction, one which is worthy of the most careful study, and which deserves the strongest commendation. The masonry wall is carried on piles, and so floated in the mud; it, however, is not the real retaining wall, but simply a substantial facing, which gives a permanent finish of convenient shape; the same pile foundation extends back of the wall, and is filled in and around with a mass of rip-rap, which distributes the weight over a large area of the mud, while the whole is braced up by piles driven at an angle; the real retaining wall is the combined mass of riprap, masonry and piles, the whole floated in such a mass of mud that it is practically consolidated into one mass. The fact that this wall has settled in places is exactly what was to be expected; it is no proof of weakness or instability; the wall is simply the finished edge of the 250-ft. marginal way, and the whole has settled together; so long as it performs its duty of furnishing practically a vertical surface on the water side of this way, it is perfectly successful. The function of this wall is that of a practical tool; it is not a monument; though handsome, it is not intended for ornament; it performs none of the functions of the foundation of a building; its development has been gradual, and it is probable that future improvements will be made: but this Board does not hesitate to say that it considers this wall a solution of a very difficult problem, which is remarkable for its originality and the excellence of its results.

*The Piers*.—With the exception of Pier 1, which was apparently designed for a monumental work, the piers are simply the best examples of a form of construction which is in almost universal use in American seaports. This Board has examined the details of the plans. The piers consist of piles capped by 12 × 12 in. timbers, covered with planks, and provided with such braces and special protections as are needed to resist the blows of passing ice and of vessels which strike them. They are admirably adapted to their duties, and probably quite as expensive structures as it is now wise to float in mud. The only objection that can be raised is the perishable character of the timber, and, so long as the piers must be founded on piles, which is by far the best way of securing mud flotation, we know of no better form of construction which promises sufficient permanence to justify its increased cost.

Plans have been prepared for a more permanent structure, and one constructed above high water, of fireproof material. This structure would be virtually permanent, except for the action of the teredo on the piles, an action which is now generally very slow, though somewhat irregular. While the construction of one such pier would be interesting and desirable as testing the advantages of more permanent work, this Board is not yet prepared to recommend such construction.

Below Barclay street, where at present the city owns comparatively little property, foundations could be sunk to the rock, and it might be wise to estimate on more permanent work, but it must be remembered that the rapid changes in the ocean marine of the last 20 years have called for corresponding changes in piers and docks, and that it is probable that expensive permanent piers may have to give place to work of different dimensions before the value of their increased cost has been realized.

*The Present Situation as to Occupation*.—The North River, as now available for steamship purposes, practically extends from the Battery to the property of the New York Central & Hudson River Railroad Company, at Fifty-ninth street. This reach is cut in two by the portion between West Eleventh and West Fourteenth streets, where the piers are so short as not to be available for steamship use. Plans which have recently been adopted provide for a change in the location of the bulkhead wall between Charles and Gansevoort streets, so as to permit of the construction of long piers. These long piers cannot be carried above Gansevoort street without removing the new West Washington Market, so that Gansevoort street practically divides the North River front into two parts. While above Twenty-third street there is a reach which is well adapted to steamship service, and is already used in this way, it is the portion below Gansevoort street which now needs special consideration, without prejudice, however, to similar developments above.

The length, measured on the bulkhead line, from the Battery to Gansevoort street, is 13,439 ft.—a little more than 2½ miles. Of this, 8,098 ft.—about 1½ miles—belongs to the city: 3,433 ft. belongs to various private owners, and 1,917 ft. to railroads. The city owns about 60 per cent. of the whole.

The present use of the 13,439 ft. is as follows:

| | Feet. |
|---|---|
| Foreign steamship lines | 1,779 |
| Coasting steamship lines | 1,861 |
| | 3,640 |
| Railroads | 3,883 |
| Ferries | 1,116 |
| Miscellaneous, including inland steamboat lines | 4,800 |
| Total | 13,439 |

In other words, of the 2½ miles of water front which is better adapted than any other to the use of the class

of commerce on which the prosperity of New York is most dependent, only 13.24 per cent. is now occupied by foreign steamship lines, and only 27.08 per cent. is occupied by all classes of ocean steamships, while 28.89 per cent. is occupied by railroads.

*Provisions to be Made.*—The ferries must remain where they are. Facilities must be provided for railroads, and for North River steamboats (though the transfer of the latter to points above Gansevoort street should be considered). If the ferries, railroads and miscellaneous uses could be confined to a total length of ½ mile, there would remain 2 miles available for ocean steamers. This would provide 30 to 35 first-class steamship piers, which would accommodate all the steamships now landing on both sides of the North River, besides leaving a considerable margin for the growth of commerce. It appears to this board that the first thing to consider is what methods can be adopted to bring about this result.

In the first place, the general principle should be followed of always, when making leases, giving preference to the class of traffic for which this portion of the harbor is specially adapted. Steamship lines should always be given preference over any other class of traffic. Existing leases cannot be interfered with, but prior occupation should have no rights in preference to class of service. If a steamship line wishes space now occupied by a railroad or a river boat line, it should be given that space at the expiration of the tenant's lease without reference to length of occupation by the tenant Though the ferries must remain where they are, other locations can be found for the Sound steamers, and even for North River boats. The most difficult problem is that of the railroads, which calls for special attention.

The old practice of the railroads terminating on the Jersey shore was to deliver and receive their freight in freight houses on the west side of the river, from or to which it was transferred to or from piers on the New York side, these piers becoming the New York City freight stations. This practice has gradually undergone a change, till instead of being loaded or unloaded on the west side of the river, the cars are transferred across the river on floats. As a rule the cars are not removed from these floats, but are loaded and unloaded while standing on the floats in slips; in other words the slips which might be used for ocean commerce are converted into space to stand cars while loading and unloading local freight, a service which could be perfectly well performed on land. At the foot of Twenty-third street the Erie Railroad adopts a different course, and the cars, when once brought across the river, are transferred from the float to a yard on shore, where they remain while they are loaded and unloaded. If this same principle could be applied to all the railroads terminating in New Jersey, perhaps four ferries, each occupying a width not exceeding 150 ft., or a total of 600 ft., could do all the work for which the railroads now use 3,883 ft. This would effect a saving of 3,283 ft. or nearly twice the frontage now occupied by all the foreign steamship lines.

After these criticisms of the present method of use of the North River water front and suggestions of the modifications desired, the actual changes necessary to accomplish the desired results must be considered.

[TO BE CONCLUDED.]

## The Rack Locomotives for the Snowdon Railway.

BY CAMILLE BARBEY, *Eng. Locomotive Dept., North Eastern R. R., Switzerland.*

It is an honor for Swiss engineers to be perhaps the first since Blenkinsop to build "rack locomotives" for a railroad in England. We think it therefore of some interest to give a few details of the engines which have lately been built at the Swiss Locomotive Works Society of Winterthur, for the only rack railroad of England.

These engines are the same as the one constructed last year for the Wengernalp Railroad, and which is the No. 10 of that company's engines. This locomotive of the Wengernalp road is a departure from the Abt rack locomotives first constructed in 1890 at Winterthur for the Monte-Generoso Railroad, and which engines were the first rack locomotives constructed in Switzerland since 1875 excepting the Pilatus engines (1886), a quite special type for an incline of 48 per cent.

After the engines built from 1870 to 1875 under Riggenbach's supervision, for the Rigi and Rorschach-Heiden lines were completed, 15 years elapsed, during which no rack railroad with inclines of 25 per cent. was constructed, until the Monte-Generoso line was opened and operated with a new type of rack locomotive quite different from those delivered to the Rigi lines, although built for the same incline (25 per cent.). This type of engine, designed by Mr. Roman Abt and the Locomotive Works of Winterthur, has since been adopted for the following mountain railroads: Brienz-Rothhorn Glion-Rochers de Naye, Wengernalp and Schynize-Platte. The first two of these lines are laid with Abt's rack system and the last two with Riggenbach's system. The maximum incline is 1 in 4, and the sharpest curves are 183 and 245 ft. radius. The gage is 2 ft. 7 in.

In 1894, Mr. Strub, Director of the Berner Oberland Railroads, to which the Wengernalp line belongs, ordered from the Winterthur Works a new locomotive, introducing the following modifications in the general arrangement: The stroke of the piston, which was in the first engines 21¾ in., was increased to 23¾ in.; the working-beam had its lowest instead of its middle point fixed to the engine-frame, the connecting rod being attached to the middle point of the beam; the distribution of steam is on the Belpaire instead of the Brown system in this last engine, which, as we have before said, is identical with those built for the Snowdon line. These modifications made it possible to obtain a shorter length for the whole locomotive. The connecting rod works on the second instead of the first axle.

We give in Figs. 1, 4, 5 and 6 sections of the engine constructed for the Monte-Generoso line in 1890. Fig. 2 is a view of the type of engine constructed since for all the rack lines in Switzerland with maximum inclines of 1 in 4 (25 per cent). About 25 locomotives of this type are in service in Switzerland This engine is identical with the one of the Monte-Generoso except that the cab is more elegant and the luggage-van has been taken away. It is one of the best designed rack locomotives running, and has been, we suppose, admired more than once by English locomotive engineers traveling on the mountain railroads of Switzerland; for my personal taste, I prefer it to the new form adopted for the Wengernalp and Snowdon lines. It will be perhaps of some interest to mention briefly a few of the construction details of these locomotives.

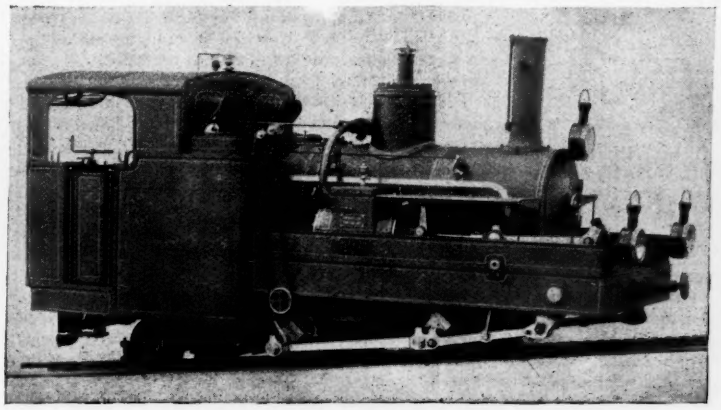


Fig. 2.—Rack Locomotive for the Glion-Naye Railroad, Switzerland.

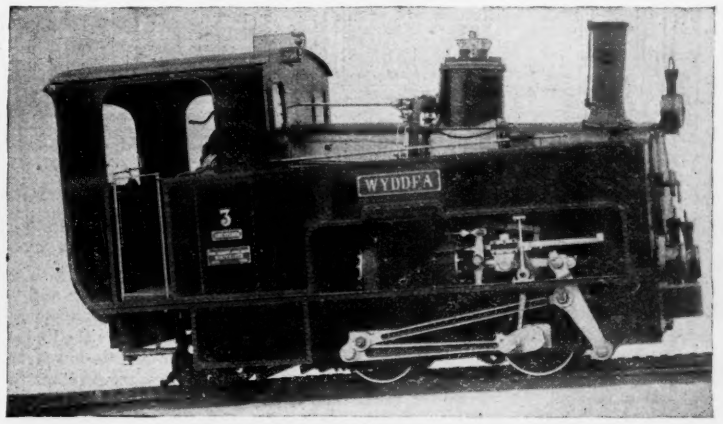



Fig 3.—Rack Locomotive for the Snowdon Railway, Wales.

The frame lies on three axles, of which the first two carry the pinions. These axles are supported by four wheels which are loose on them, while the trailing axle is of the Bissel system. Each of the two pinions is divided into two discs which carry the teeth; the discs are fixed to one another through springs which permit a slight relative play, and thus allowance is given for lack of exactness in the cutting of the rack teeth. The discs and the pinions being quoined at different angles four teeth are always in gear with the Abt double bar rack system. The engines for the Riggenbach rack system have only two pinion discs, two teeth being in gear; the difference in smoothness of gearing for the two systems of rack is not perceptible if both engines are identical excepting the pinions.

The boiler is of the usual type with a working steam pressure of 196 lbs. It carries in the middle a dome with safety-valves of the Winterthur works type, which is similar to the Ramsbottom. The throttle-valve is of a special design, usual for all the Swiss mountain engines of this class. The cylinder disposition and distribution of steam is on the Brown system, Mr. Brown having been for some years Director of the Winterthur Locomotive Works. As we have said above, this arrangement has been modified for the Wengernalp and Snowdon engines.

The different brakes in use on these engines have been carefully designed, as, indeed, have all those of the Swiss mountain locomotives. The first to be mentioned is the counter-pressure air-brake, first designed and applied by Riggenbach to the Vitznau-Rigi engines in 1870. The reversing-gear is placed in backward motion. Air taken through a special opening is compressed in the cylinders and in the distributing pipe from which it escapes through a valve which is controlled by the engineer, who opens this valve more or less, and so regulates the speed of the train, which can also be modified through the reversing gear. Travelers on our rack railroads will certainly have noticed the escape of the compressed air which makes so terrific a noise when a train is descending a sharp incline; it is needless to say that this brake works splendidly. Each engine is fitted with an automatic steam brake which presses the blocks against the pinions when the speed of the descending train exceeds five miles an hour; this automatic brake is made of a disc turning with a speed proportional to that of the engine; when the maximum speed is attained the centrifugal force drives out a tooth maintained by springs in the interior of the disc; this tooth moves a rod which opens a valve admitting steam to a small brake cylinder. A handbrake also operates the blocks on the two pinions.

The following are the principal dimensions of the Snowdon engine:*

| | | |
|---|---|---|
| Gage | 2 ft. 7 in. | 800 mm. |
| Pinions, diameter | 22½ in. | 573 " |
| Cylinders, diameter | 11¾ in. | 300 " |
| Piston, stroke | 23⅝ in. | 600 " |
| Boiler, working pressure | 196 lbs | 14 atm. |
| Heating surface | 390 sq. ft. | 36.50 sq. m. |
| Tubes, length | 5 ft. 10 in. | 1.920 m. |
| " number | 156 | 1:6 |
| Grate, surface | 7 sq. ft. 2 in. | 0.66 sq. m. |
| Total weight | 16 tons 896 lbs. | 16.7 tons. |
| Wheel base, rigid | 4 ft. 4½ in. | 1.350 m. |
| " " total | 9 ft. 9½ in. | 3.000 " |
| Height of stack above ral, | 9 ft. 2⅝ in. | 2.820 " |
| Maximum speed per hour | 5⅝ miles. | 9 km. |

## The Reorganization of the Engineer Corps of the Navy.

BY IRA N. HOLLIS, *Professor of Engineering, Harvard University, Formerly Passed Assistant Engineer U. S. Navy.*

II.

[The first part of this analysis of the bill now before Congress appeared in the *Railroad Gazette* last week.]

3d. The third point in the bill *to give military or naval titles to all officers of the Engineer Corps* is likely to be even more bitterly opposed than the increase of numbers. There is no certainty of just how far this would improve the status of the engineer. It is altogether likely that its chief merit lies in the fact that it will ultimately bring the line officers and engineers into more helpful and sympathetic relations, a condition devoutly to be wished. At present the proposition does not promote peace between the two corps, but once a well established law, it would work smoothly, and the present disagreement would be forgotten.

The Engineer Corps, as now organized, has three grades: Chief Engineer, Passed Assistant Engineer, and Assistant Engineer, with certain relative rank given to fix precedence so that there may be no disputes about the order in which officers select their rooms on board ships, march in a funeral procession, approach and bow before the President at a New Year's reception or sign their names on official papers. The actual grades above mentioned are essentially civil titles, and have no place in a military service. We speak of the Chief Engineer of a railroad or of a ship, of an Assistant engineer in a bridge company or on a survey, and the titles have come to have a distinct meaning in connection with civil pursuits. In a military service rank and titles are given not to indicate an officer's duty but to classify him, to make plain as far as possible the date of his precedence, to fix the relative responsibility of his duties, and above all to indicate that he holds a position in the military service of the government The rank does not necessarily show what a man's duties are. Although we may usually suppose that a captain in the navy commands a ship when at sea, we cannot tell from the title what he does on a shore station. Nobody can tell what a lieutenant or an ensign does, as the rank indicates nothing. This explanation is given to show that the bill does not contemplate a revolution of naval methods. It is intended merely to make the service more homogenous by giving the same rank and titles to all graduates of the Naval Academy who enter the line and engineer corps. This will fix more definitely the right of the engineer to command with his own men and it will not make one whit's difference in the ship's organization. The engineer in charge of the machinery will still be the chief engineer, whatever his rank and the officer in com-

*The author has given the dimensions in English and metric system, to show how difficult it is to compare the dimensions of English and American with continental locomotives. He, therefore, wishes good luck to all engineers who are struggling to bring the metric system into England and the United States.

mand of the ship will still be the captain, if his rank be only ensign. So far as the discipline of the ships is concerned, it would be improved instead of being broken up, as the engineer could not fail to find more ready recognition of his duties and functions. The principal objections on the part of the line, no doubt in most cases sincere and conscientious, are: That engineers are endeavoring to share the rank and titles that have belonged to the line for generations; that the rank and title will, after the change, give no indications of an officer's duties; that engineers will want to command as soon as they obtain real rank.

The only distinctly naval titles in the navy are admiral and commodore, the others are practically taken from the army, and do not belong exclusively to the navy. The title captain may be applied to any one commanding men, or directing the movements of men. The title lieutenant may be applied to any one who acts for the captain, both in the army and in the navy, or who aids him in carrying out his duties. In this sense, the engineer is just as much a lieutenant as the man who walks the deck. One is likely to find it difficult to understand why titles so common in all military services, both on land and on sea, should be so jealously guarded as the sacred birthright of officers of the line of the navy; especially when the conferring of those titles on staff officers would not detract from the authority of the line. As already stated, these titles, even now, give no indications of the duties.

The bill is very carefully drawn to give no engineers by virtue of their rank the right to command, except when assigned to such command or duty by competent authority. The competent authority would be the President of the United States, the commander-in-chief of a squadron, or the captain of a vessel acting singly. This does not look particularly dangerous to the efficiency of our ships, especially when the detail of an engineer to command will be practically in the hands of the line. There can be nothing disorganizing if the engineer does desire to command. Nobody ever dreams that the service is in danger or even less efficient because the lieutenants and ensigns want to command. The mere possession of rank does not entitle any man to command unless he be properly detailed to the duty or be ordered to duty which will place him in line of succession to command. There is no doubt that the effectiveness of any military service on land or sea would be destroyed if the commander did not have entire control and entire authority to maintain discipline, or if the line of succession to command were not clearly fixed by law, or by orders of the commander-in-chief. Along with this entire control must go the right to select any officer for a particular service, or for the command of an expedition, if the commander sees in that officer the man most likely to carry his duty to a successful issue.

As a matter of fact, cases have occurred where the commander of an expedition has taken that right without authority of law. The occasion requiring the detail of an engineer to command will seldom arise; but it is to be hoped that the executive may have power to make such a detail, if he finds it advisable. It will make little difference to the country whether a commander springs from the line or from the engineering corps, provided the best man is selected. It is freely admitted that the line officer, from the nature of his duties, has greater opportunity to demonstrate his fitness for command, and if the President is to have no discretion in the matter the selective right to be confined to the line rather than to the engineer corps; but the President should have latitude in the matter. If the engineer turns out to be a better and stronger man he ought to command. Courage, coolness, and the ability to control men does not follow the line of promotion, nor are these qualities confined to one corps. It is a poor kind of patriotism which would limit the executive in his choice, if the safety of an expedition or the honor of the flag depended upon his selection.

As stated above, the struggle now going on is the result of conditions beyond the sailor's control. The methods of propulsion having been revolutionized, a clash was certain to come eventually. The engineer is just as certain to win. It may take years, but our officers are sure to become engineers in the course of time. Anything that hastens the changes and serves to weld the line and engineer corps into one should be welcomed by all officers alike.

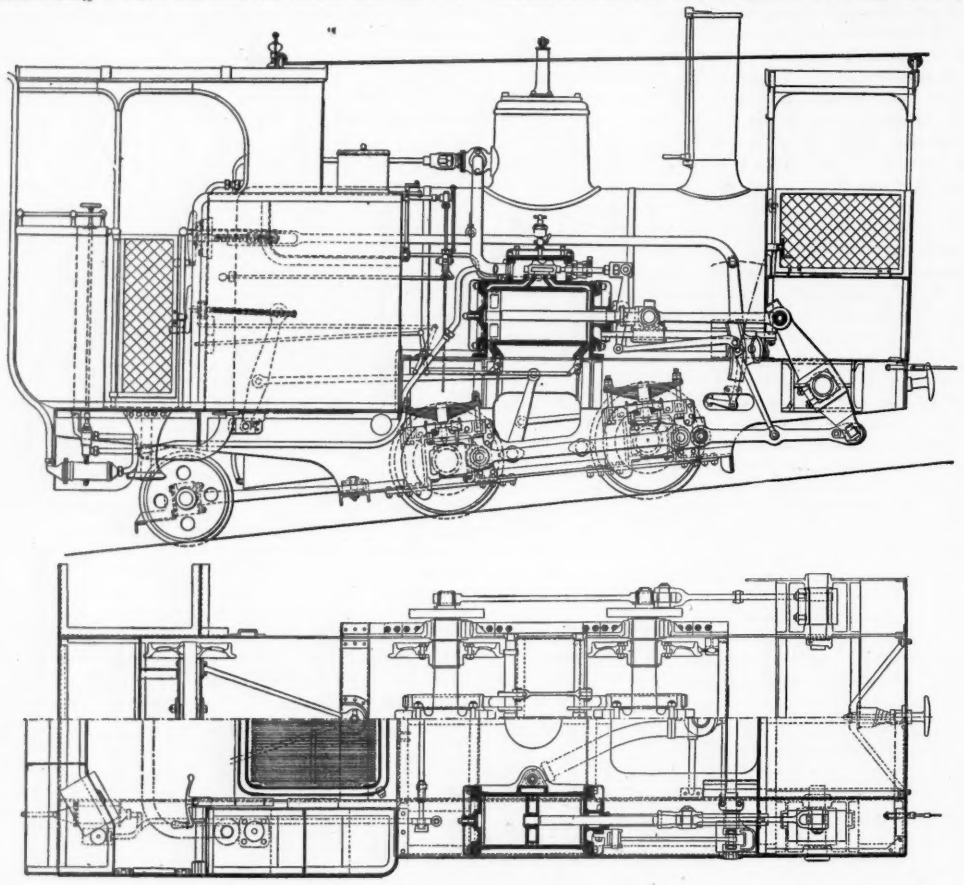


Fig. 1.—Side View and Plan of Rack Locomotive for the Monte Generoso Railroad, Switzerland.

NOTE. — *These drawings, and the others accompanying this article, are from a book on Swiss Locomotives, by Mr. Barbey, to be published at Geneva in February.*

By a strange fatality it was an engineer who, more than a century ago, by inventing the steam engine started the train of circumstances that has led up to this struggle in the navy, and to the far greater struggle of the working people all over the country. It is no exaggeration to say that James Watt has had a far greater influence upon humanity, national life, and even warfare, than Napoleon, Wellington and Nelson. Coming down nearer to our own time, it was the invention of another engineer that changed completely the types of our fighting ships. As the navy is constituted to-day, the line officer who inspects steel or designs a gun is already an engineer if he does his work properly, and he is no more fitted to command than the man who runs an engine. Just as with the engineer, his power to command is slowly lost if all his time is spent over a drawing board or in running a machine; but that is not the case with either corps. Both have executive duties of a similar nature, the organization and control of men to carry out the work on board ship and in our navy yards.

The writer can conceive of no better way of promoting the efficiency of the service, which he regards as absolutely essential to the welfare of the country than this plan, which is one step towards bringing the engineer and line officer closer together, so that ultimately there may be as many men as possible on board of every ship capable of handling both guns and machinery.

4th. The next point of the bill, *to fix more definitely the duties of the Engineer-in-Chief, and to provide for ordering two assistants to the Bureau of Steam Engineering* is an administrative detail of no special interest to the public, but it is a provision which will promote the work of the bureau. It is very closely involved with another part of the bill which follows.

5th. This *provides for changing the title Bureau of Steam Engineering of the Navy Department to Bureau of Engineering of the Department of the Navy*, and for placing under its charge all that relates to machinery and its appurtenances used on board of naval vessels, not including gun carriages and torpedoes. This is a plan to bring order out of the chaos of the Navy Department. At present machinery is placed on board our ships by four different bureaus, all independent of one another. All provide spare parts and stores separately from one another, and all watch one another with some jealousy, fearing that one bureau may steal an engine or pump from another. One can imagine the uniformity of the machines and the common interest manifested. If one bureau happens to be out of oil or waste on board a naval vessel, a transfer of these articles from another bureau may be effected by making out requisitions in quadruplicate and sending them through the proper channels. The whole system is so cumbersome and preposterous that it would fall at once if the country were involved in a war.

The exigencies of the service in time of peace have already made it necessary to place the repairs of machinery, whatever bureau it may be under, in the hands of the engineer. He is made responsible for machines over whose running he has no control. He has only recently been permitted even to examine machinery not directly under his bureau to guard against mishap. The bill will place all machinery under one head and will utilize to the fullest extent the experience of those men who have had most to do with machinery. This proposition is so business like and self evident that very little comment is required.

6th. The next point—*to place under the Bureau of Enginee ing the inspection of all steel material used in construction*—is not so plain. There does not seem to be any reason why the naval constructor who uses all the steel plates and frames which go into the hull, and the ordnance men who receive tons of gun forgings and armor should not have a share in this, and it is not entirely clear why the present steel board, changed to include an officer from each of the bureaus of ordnance, construction and engineering, should not do this work efficiently.

7th. The proposition to *provide an examination for promotion from every grade to the next higher* is a wise one. The engineer corps has suffered for years from the lack of this provision by the presence of men on its upper grades who should have been retired.

8th. This point in the bill to *fix responsibilities of engineer officers on board ship* involves no great change from the practice of every ship which is commanded by a man of good sense, with decent consideration for his subordinates. It is intended mainly to prevent the abuse

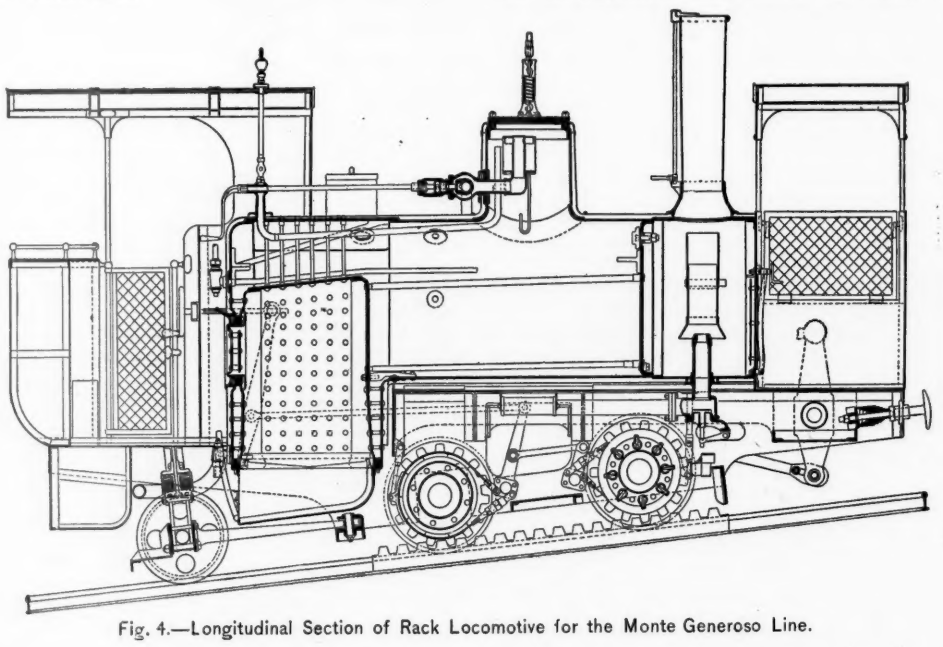


Fig. 4.—Longitudinal Section of Rack Locomotive for the Monte Generoso Line.

of power in the hands of arbitrary and ill-mannered officers, and to strengthen the engineer in dealing with his men.

9th. The clause to *provide for retirement at the age of sixty instead of sixty-two* will help the service, as it represents the gain in age due to climbing up and down engine room ladders, standing watch in the machinery compartments, and inspecting double bottoms. The second part of the provision to retire officers after 30 and 35 years of service may frighten Congressmen who fear a large retired list, and may lead to a limit placed on the number of retired officers.

10th. Another clause of the bill *gives to Senators of the United States the appointment of engineer cadets at the Naval Academy.* It would amount to a complete restoration of the old course for engineers instead of the present course for naval cadets who do not separate into special corps until after several years at the school. The cadets at the Naval Academy are now appointed by the members of the House of Representatives, and this would give the Senate a proportionate representation. There is some advantage in making appointments through the Senate as it distributes the men more uniformly over the whole country instead of sending them principally from the great centers of population.

11th. The proposition to *make graduates from technological schools eligible for appointment in the Engineer Corps of the Navy*, would for a few years have the effect of placing the Naval Academy in competition with outside schools. There would be a number of appoint-

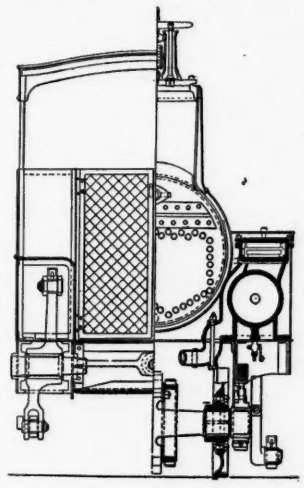


Fig. 5.

ments from the outside schools while the corps was filling up to the limit proposed, but after that the vocancies available for men in civil life might become somewhat fluctuating in number. In this point the bill is not clearly drawn and does not make plain the method of appointing men from civil life. Whether they would get in by political pull or by competitive examination does not appear. If well administered, this part of the measure would benefit the technical schools by bringing about greater uniformity, and in some cases by raising their standard.

12th. Any plan such as that permitting *the enlisted men who have served three years in the Engineer Department to compete for commissions along with the engineer cadets* is in accordance with our democratic institutions. It would certainly induce men to enlist for a cruise in the hope of getting a commission, and would in that way increase the average intelligence and efficiency of the men on board ship.

13th. Those clauses *providing for the detail of engineers to the technological schools approved by the Secretary of the Navy, and for the loan of machinery and models* is a slight extension of the law now on the statutes providing for the detail of engineers to colleges. The army is already empowered to loan small arms and equipments to colleges having a military instructor detailed from the army, the above proposition, therefore, is not new. The officers detailed from the navy under the old law did much to aid the cause of engineering education all over the country, and there is no doubt that the smaller colleges especially would profit greatly by this governmental aid.

14th. *The provision of a suitable place for engineering experiments found expedient for the best interests of the naval service*, will be of great value. The bill, however, is drawn rather narrowly, as it should have made the experimental station available for experiments of all kinds which would be useful to the country at large. There are a great many investigations that private establishments cannot afford to carry out, and that the government should undertake if we are to attain pre-eminence as an industrial nation. The direction of the nature of the experiments should, however, be under a commission appointed by the Engineer-in Chief of the Navy and the American Society of Mechanical Engineers. The execution of the work planned might very well remain where the bill proposes to place it—in the hands of the Navy Department. The writer believes that such a station could not fail to produce lasting benefit.

15. The last part of the bill *provides for the pay of the engineers.* The rates are based substantially on the present pay of the line of the Navy.

In conclusion a few points of general interest not specially concerned with this bill may be brought out.

Several years ago an article appeared in one of the service papers on the subject of the engineers. It was written by a lieutenant of the Navy with the approval of a Line Committee, stating that the engineers were entirely wrong in their demands for recognition. He further declared that they could have no careers as their training was so technical that it confined them to subordinate positions with which they must be content. It is obvious that no man of sense could write such stuff seriously. The positions filled by many who have resigned from the engineer corps is sufficient proof of their capacity to find careers, and if the line of the Navy or the Department have striven to deny them opportunities to make careers in the service, the government has been defrauded by the very men who should look with favor upon everything which tends to elevate and to make valuable to our country the services of their brother officers. If men are denied adequate recognition, it does not follow that they are not fit for higher rewards, or that their right to remain content with the lot in which it has pleased Providence to place them. It is nonsense like this which embitters the engineer and convinces him that the system which turns out such men is radically wrong.

The engineer corps has lost many of its best men within a few years. The officer in the engine room or fire room cannot help feeling that he is just as essential to the naval service in time of peace and war as the man who commands a gun division or who looks after deck bright work and the hoisting of ashes at sea. The bill is intended to aid in building up a reserve of engineers who have been to sea in naval vessels. Under the present conditions of service the most effective method of killing a naval reserve will be to take its members to sea for a year. One experience will be sufficient to content them for the rest of their lives. So far as the daily life on board ship and the personal relations among the officers are concerned there is nothing to complain of. The officers get on well at the mess table and friendships are not confined within corps. It is the official life that makes the navy trying to the engineer. The line of the navy contains many men of high and conscientious aims, whose desires are solely for the good of that service in which all of us take patriotic pride, but the guidance of affairs relating to the personnel of the navy is unfortunately in the hands of a few whose lives have been spent mainly in or around Washington, and who pursue their ends with the fanaticism we sometimes find in a Protestant converted to Catholicism.

The writer, after an experience of 19 years in the navy, has a sincere desire to promote its efficiency, and the pleasant official relations which ought to exist among its members. He feels, however, that this would be most easily accomplished by a sympathetic study of one another's needs, and such mutual concessions as would secure united action.

## The Floods of February 6.

A severe rainstorm, combined with melted snow, did great damage in Connecticut, New Jersey, Pennsylvania and in some places outside of those states on Thursday, Feb. 6. The most notable railroad disasters were at Bristol, Conn., where an old bridge was carried away and six workmen were drowned, and at Bound Brook, N. J., where one abutment of a bridge of the Philadelphia & Reading was washed out, stopping traffic between New York and Philadelphia.

The loss of life at Bristol seems to have been due to carelessness, if not foolhardiness. The wooden bridge over Pequabuck River, about 60 ft. long, on the main line of the New York & New England, had been weak for some time and was partially supported by trestling, and preparations were being made for replacing the bridge with new steel girders. It appears that the two girders had been placed on false works immediately at one side of the track, ready to be slid into position. Things being in this shape, the flood undermined the support of the old structure so that it sank about 2 ft. under a passing train, and the hind car of the train was got off the bridge with difficulty. Men were brought from Hartford and preparations were made (about 9 p. m.) to put the new bridge in position at once. To do this the workmen went upon the old structure, and while they were upon it taking up ties, a large part of it was carried down stream and 14 men fell into the water. It would appear that the stiffening effect of the rails, which had just been taken up, had been a main factor in keeping the bridge in place. It is said that 20 employees of the contractor who was putting in the new bridge refused to venture upon the shaky bridge.

The extent of the damage to the bridge at Bound Brook is not reported, but it seems that the Reading trains had to run over the parallel line of the Lehigh Valley for several days. At Bound Brook there was a fire as well as a flood, and the total damage is estimated by some as high as $200,000. At Philadelphia the Schuylkill River was very high, and the passenger station of the Baltimore & Ohio was submerged so deep that business had to be suspended. The water was also very high in the Delaware River, and the ferryboats to Camden were for a time unable to land. Much damage was reported from other places on the Delaware, particularly Bordentown and Lambertville. At Morristown, N. J., a dam broke away, and the reporters estimate that $50,000 damage was done in the town. The Whippany River Railroad, five miles long, was badly damaged by washouts. A dam was washed away at Turners, N. Y., damaging the roadbed of the main line of the Erie Railroad. At New Brunswick, N. J., there was a good deal of damage in the lower parts of the town. The Brunswick Traction Company had a large number of ties floated away. The New York Central had a bad landslide at Hastings, N. Y. Damage of the same kind as the foregoing was reported from Dover, N. J., Bethlehem, Pa., Wilkes-Barre and various points on the Schuylkill River.

These reports are of such a character, many being indefinite, that we cannot summarize them within reasonable space. This indefiniteness is especially noticeable in the reports of bridges carried away or damaged, but we note below such items of this kind as seem to be reliable. Many of the items apparently refer to very short spans.

Ackermanville, Pa.: Two railroad bridges on the line of the Bangor & Portland reported swept away. Bethlehem, Pa.: High trestle at Union street depot carried away. Boonton, N. J.: The property of the Delaware, Lackawanna & Western at this place was much damaged. Part of the railroad bridge was swept away. Conshohocken, Pa.: Three bridges along Plymouth Creek reported destroyed. Easton, Pa.: Several bridges between this place and Bangor, on the Easton & Northern road, are reported damaged or washed away; also four bridges, presumably highway, over Allegheny and Hemlock Creeks. Flemington, N. J.: Several small bridges on the Central of

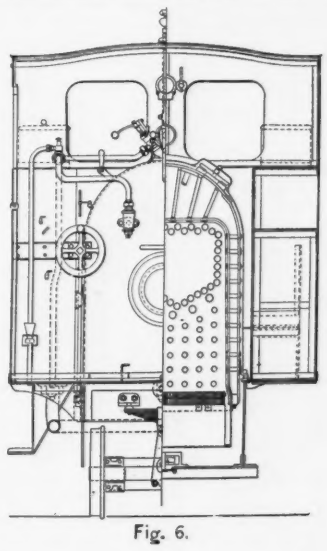


Fig. 6.

New Jersey. Hawleyville, Conn.: A railroad bridge on the Berkshire division of the New York, New Haven & Hartford road is reported washed away. Hermit Lane, Pa.: The iron wagon bridge washed away; also a foot bridge. Morristown, N. J.: The damage to county bridges in Morris County is estimated at $100,000. Neshannock, N. J.: A 125-ft. bridge carried away. Newport, Pa.: Trestle over Buffalo Creek reported destroyed. Northumberland, Pa.: The Delaware, Lackawanna & Western bridge over Briar Creek carried away. Orange Co., N. Y.: The Erie Railroad lost several small bridges. Philadelphia, Pa.: Three small bridges in Fairmount Park destroyed. Portland, Pa.: The Bangor & Portland Railroad bridge reported carried away. Simonsville, Conn.: An iron bridge, 200 ft. long, over Naugatuck River, reported swept away. Sparta, Pa.: New York, Susquehanna & Western bridge reported destroyed. Stroudsburg, Pa.: The bridge over the creek at Reeder's Station, on the Wilkes-Barre & Eastern, was washed away. This road is operated by the New York, Susquehanna & Western. Waterford, Pa.: Two highway bridges reported washed out. Wissahickon, Pa., reports two small bridges gone. Woodlands, N. Y.: The New York & Northern Railroad bridge over Sawmill River is reported swept away.

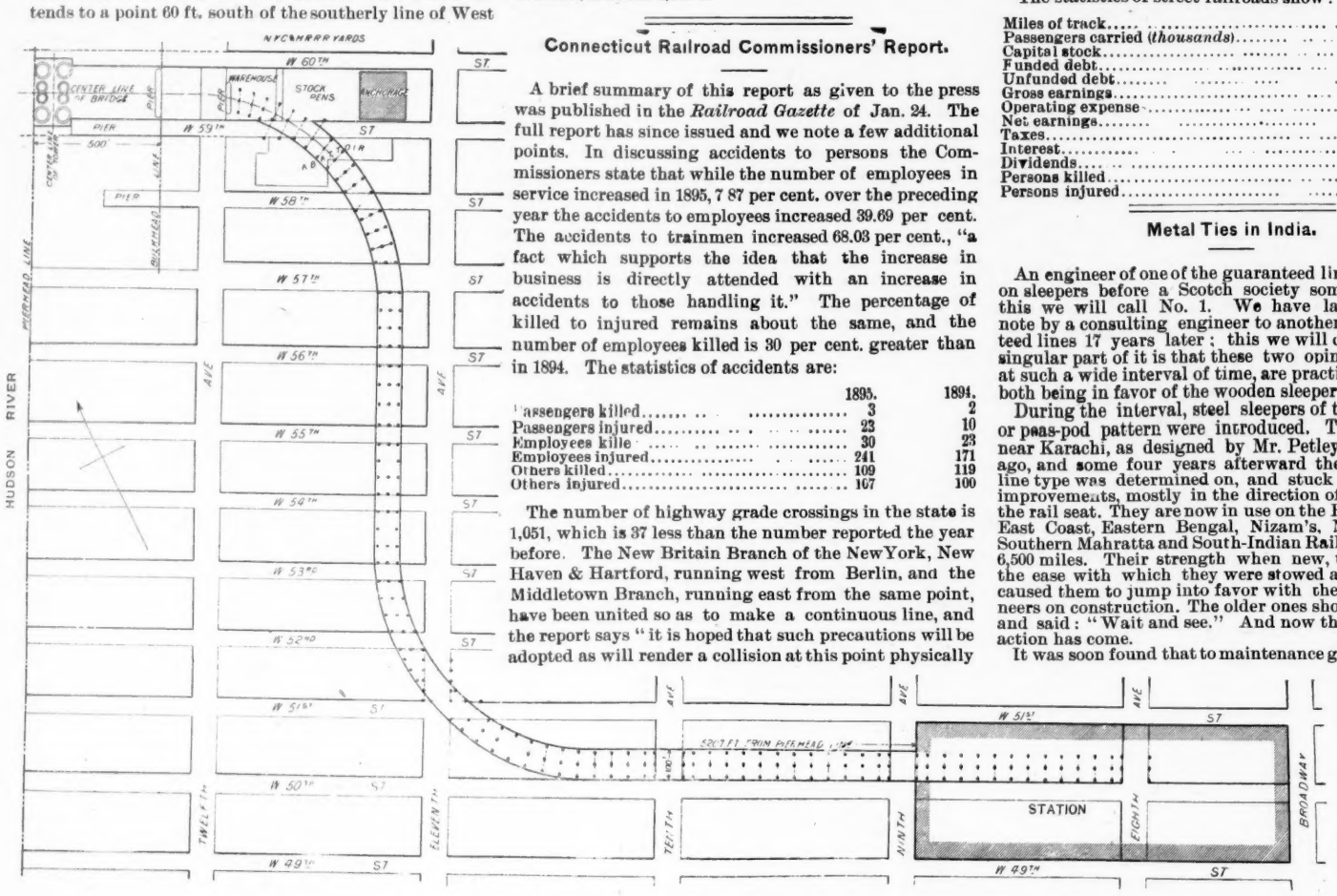
## The Site of the New York and New Jersey Bridge.

While we do not regard the beginning of the building of the New York & New Jersey bridge as imminent, still it is a work of such magnitude and such great public interest that we should fail in our duty to our readers if we did not record the steps taken in the slow progress toward building. The latest important step is the designation of the site. As we have announced, the Commissioners of the New York & New Jersey bridge have provisionally approved of a site for the bridge and of the location of the New York approach, the location being changed from that heretofore approved. The site now chosen for the bridge itself is on a line midway between the southerly line of West Fifty-ninth street, New York, and the northerly line of West Sixtieth street, this line to be produced until it intersects the westerly line of the anchorage of the bridge in New Jersey. This line is prolonged easterly, parallel with and midway between the street lines mentioned above, to a point 100 ft. west of Eleventh avenue or West End avenue, where it intersects the easterly line of the anchorage. The route of the New York approach is shown by the diagram.

The New York terminus of the bridge may be said to begin at the pierhead line, there being three shore piers besides the anchorage. All of these are shown in the accompanying illustrations together with the proposed arrangement of the under part of the shore span, which,

as will be seen, is divided into warehouses and stock pens. The New York Central & Hudson River freight yards are just to the north of the bridge anchorage.

The approach to the bridge, the route of which we briefly outlined last week, leaves the pier at Twelfth avenue and West Fifty-ninth street, and curves to the southeast on a curve of 780 ft. radius. This curve extends to a point 60 ft. south of the southerly line of West



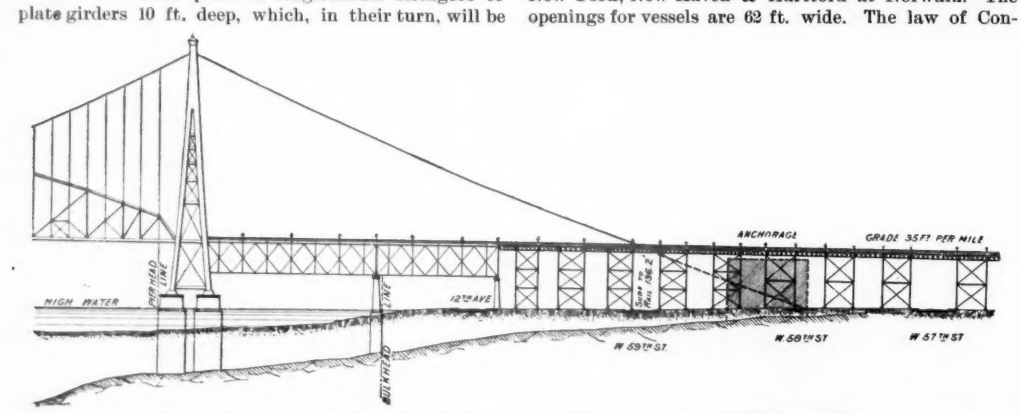

Route of the Proposed Approach to the New York end of the New York & New Jersey Bridge, Showing Site of Union Station.

Fifty-seventh street, at which point the center line of the viaduct is about 150 ft. west of the west side of Eleventh avenue. From here the viaduct continues nearly south in a line parallel to Eleventh avenue. This line continues to a point 150 ft. south of the southerly line of West Fifty-fourth street, and from here the viaduct curves with the same radius as before, crossing Eleventh avenue between Fifty-first and Fifty second streets, and continuing to the southeast until it reaches the north line of Fiftieth street, along which line it extends to Ninth avenue. Here the Union station is to be located. It will occupy the blocks from Forty-eighth to Fifty-first streets and extend from Ninth avenue over to Broadway.

The viaduct will be a steel structure, its cross section, as now proposed, showing three lines of posts, one in the center and one at each side, the span crosswise between each two of these posts being 40 ft., making the entire width of the viaduct 80 ft. Lengthwise, the posts are connected in pairs by means of lateral bracing. This is shown in the engraving. The viaduct averages about 110 ft. in height from the surface of the ground to the base of the rail. The tracks, of which there will be six, are carried on six pairs of longitudinal stringers or plate girders 10 ft. deep, which, in their turn, will be carried on latticed cross-trusses, extending across the top of each bent. The same style of girder extends longitudinally between the posts.

The grade on the viaduct from the bridge to Ninth avenue is 35 ft. to the mile, but from Ninth avenue to the station it is level. The height of the viaduct at the station entrance is 64 ft. The premises intended to be occupied for the approach is a strip of land 100 ft. in width, being 50 ft. equally distant on each side of the center line of the approach, as shown in the engraving.

Our engraving of the end of the bridge and viaduct shows only a view of a small part of each. There are in the viaduct 84 cross-bents of three columns each, situated for the most part at right angles to the line of the bridge, although in some instances on the curves it has been necessary to cross the lines of columns on a skew. The entire length of the approach, which includes that part of it inside the station from Ninth to Eighth avenues, is about 4,100 ft.




New York end of the New York & New Jersey Bridge and part of the Approach.

## Connecticut Railroad Commissioners' Report.

A brief summary of this report as given to the press was published in the *Railroad Gazette* of Jan. 24. The full report has since issued and we note a few additional points. In discussing accidents to persons the Commissioners state that while the number of employees in service increased in 1895, 7 87 per cent. over the preceding year the accidents to employees increased 39.69 per cent. The accidents to trainmen increased 68.03 per cent., "a fact which supports the idea that the increase in business is directly attended with an increase in accidents to those handling it." The percentage of killed to injured remains about the same, and the number of employees killed is 30 per cent. greater than in 1894. The statistics of accidents are:

| | 1895. | 1894. |
|---|---|---|
| Passengers killed | 3 | 2 |
| Passengers injured | 23 | 10 |
| Employees kille | 30 | 23 |
| Employees injured | 241 | 171 |
| Others killed | 109 | 119 |
| Others injured | 107 | 100 |

The number of highway grade crossings in the state is 1,051, which is 37 less than the number reported the year before. The New Britain Branch of the New York, New Haven & Hartford, running west from Berlin, and the Middletown Branch, running east from the same point, have been united so as to make a continuous line, and the report says "it is hoped that such precautions will be adopted as will render a collision at this point physically impossible," which would seem to indicate that such precautions have not yet been adopted. The Commissioners point out that such a crossing is nearly as dangerous as that of one road with another. But they do not allude to the fact that derailing switches for the prevention of collisions are difficult to arrange in a crossing of a double track road, and that a part of them are liable to prove to be a remedy which is as bad as the disease; and there is the chance that they will unnecessariyl derail a train when it would not be dangerous for it to stay upon the rails. This being the case, we do not see how the road can reasonably make collisions physically impossible, except by making one of the lines go above or beneath the other. Instead of merely hoping, the Commissioners would do well to state just what they think ought to be done.

Among the notes on the physical condition of railroads we observe one which says that the New England road, in filling in a trestle, used 10,000 old ties and 115 old car bodies. Whether these latter are K. D. or S. U. is not stated. We trust it is the former.

Under the law of 1893 the Commissioners have approved the plans for a new four-track drawbridge on the New York, New Haven & Hartford at Norwalk. The openings for vessels are 62 ft. wide. The law of Connecticut requires railroads to abolish a certain number of highway grade crossings each year, and for the New England road this number is six; the Commissioners assume that as this company has now emerged from bankruptcy it will go on and make these changes. Orders have been passed restricting or prohibiting the sounding of locomotive whistles in Norwich, Putnam, Bristol, Danielson and Hartford. The New York, New Haven & Hartford has been granted permission to run its five-hour limited train across the drawbridge at Middletown without stopping, and the same train has received a similar permit for the crossing of the New London Northern track at Willimantic, both permits being given "under such regulations and restrictions as seem to be required for safety." Whether there are suitable interlocked signals at these places, or how it is made safer for the five-hour train than for others to omit the stop, does not appear.

The statistics of street railroads show:

| | |
|---|---|
| Miles of track | 317 |
| Passengers carried (*thousands*) | 38.037 |
| Capital stock | $8,604,240 |
| Funded debt | 7,996,000 |
| Unfunded debt | 1,123,458 |
| Gross earnings | 2,232,051 |
| Operating expense | 1,523,191 |
| Net earnings | 708,860 |
| Taxes | 76,522 |
| Interest | 278,136 |
| Dividends | 168,630 |
| Persons killed | 12 |
| Persons injured | 238 |

## Metal Ties in India.

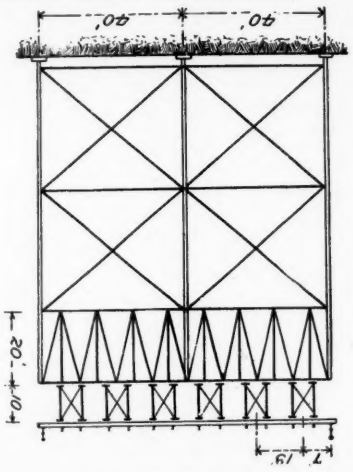
An engineer of one of the guaranteed lines read a paper on sleepers before a Scotch society some 18 years ago; this we will call No. 1. We have lately perused a note by a consulting engineer to another of the guaranteed lines 17 years later; this we will call No. 2. The singular part of it is that these two opinions, expressed at such a wide interval of time, are practically the same, both being in favor of the wooden sleeper.

During the interval, steel sleepers of the bent trough or peas-pod pattern were introduced. They were tried near Karachi, as designed by Mr. Petley, some 12 years ago, and some four years afterward the present state line type was determined on, and stuck to with certain improvements, mostly in the direction of strengthening the rail seat. They are now in use on the Bengal-Nagpur, East Coast, Eastern Bengal, Nizam's, North-Western, Southern Mahratta and South-Indian Railways, or nearly 6,500 miles. Their strength when new, their lightness, the ease with which they were stowed aud transported caused them to jump into favor with the younger engineers on construction. The older ones shook their heads, and said: "Wait and see." And now the inevitable reaction has come.

It was soon found that to maintenance gangs they were a horror, for you could not change a sleeper without taking out a rail; in saline soils, more particularly it sodium salts, they were rapidly destroyed by oxidation. And light enough in the first instance—some people (including No. 2) consider them too light from the beginning—they quickly lose weight.

The other faults of this sleeper are its harshness, which it shares with all iron sleepers; its waste of metal in the tieing portion, as compared with the cast-iron bowl or plate; its bellied shape, which makes it more liable to be rocked on its center than other sleepers; and finally, its lightness, which it shares with deodor and creosoted pine sleepers.

This last fault No. 2 seems inclined to consider the most serious, but we do not share this opinion. The recent heavy type of trough sleepers weighs 135 lbs.; an Indian deodor or pine sleeper does not weigh 120 lbs., and the majority of the sleepers under the 4 ft. 8½ in. gage, all over the world, weigh still less and yet they carry the very heaviest traffic. Where, as in England, the double-headed rail is almost universal, chairs are indispensable; but even taking these and their fastenings into account it would not bring up the weight of the rail supports to that of the sal sleeper, which weighs 220 lbs., or with chairs and spikes, 280 lbs.; of the East Indian Denham-Olphert's, weighing 230 lbs., or of the large G. I. P. and Indian Midland oval pot, weighing 236 lbs.




Cross-Section of Approach.

Nothing can take the place of proper and careful packing *under* the sleepers. The bellied form and smooth surface of the trough-ties rather favors the travel of the ballast towards the ends of the sleepers and its slipping out. As long as the ballast is kept tight up to its work, there is little tendency for a flat sleeper to slip endways; more especially a wooden sleeper, the friction of which on a tightly packed ballast while under the load, is sufficient in itself to prevent this movement.

If tightly fastened to the rail or attached to it at two points, as in an oval bowl, there are other movements likely to occur even in a well packed sleeper. The one is in the direction of the rail creep, the other is a most objectionable rocking motion tending to loosen everything. We are inclined to agree with No. 2 that, theo-

retically, a knife edge is the right bearing for a rail on a transverse tie.

Cast iron bowl sleepers have been used on nearly all the railways originally constructed, but are being rapidly replaced by steel except on the G. I. P., the Indian and Midland, the Madras and the South Indian; and by cast-iron plates on the East Indian, No. 2 puts the life of the cast-iron sleepers at 25 years or 4 per cent Now, unless, we are very much mistaken, it was found on the Northwestern Railway, after 25 years, that 10 per cent. of the oval bowls were broken and only 1 per cent. of the circular bowls. Even allowing for renewals that had taken place these figures would give a much longer life, especially to the circular bowls, which No. 1 spoke so highly of in 1877.

Now as to cost. We may take the wooden sleeper at 100, the steel at 130, and the cast iron at 155, and their respective lives at 7½, 15 and 30 years; adding simple interest at 5 per cent. and allowing a depreciation of 90 per cent. on the wooden, 25 per cent. on the cast iron and 100 per cent. on the steel, when they are taken out of the road, we find the cost at the end of the 30 years will stand in the following proportions: Cast iron, 100; steel, 212; wood, 225. If only cast steel could be used the plates or bowls would be practically indestructible, and by the time they would be scrapped in any large quantities some means of employing the scrap would probably have been devised or our present comparatively rattle-trap mode of conveyance on railways would have become obsolete.

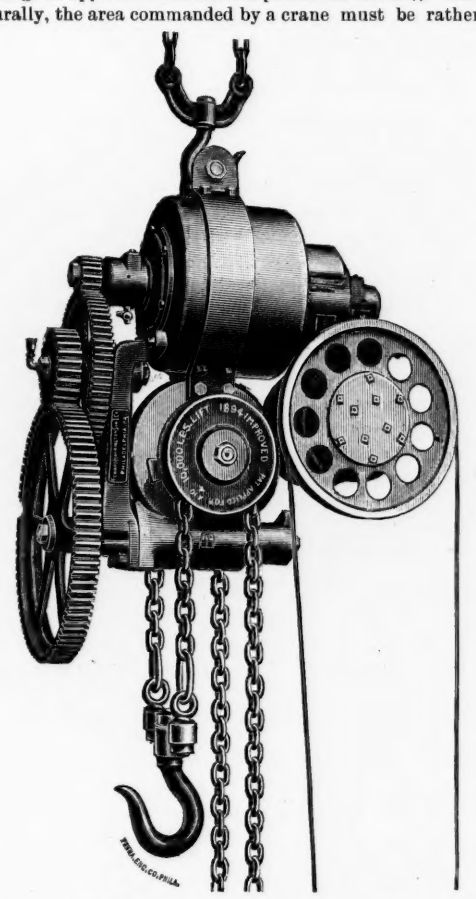
We will now give figures as to renewals based on the following:—Taking the mileage of Indian railways at 20,000, the cubic feet of timber sleepers per mile of road at 6,000, the weight of a mile of cast-iron bowls at 211 tons, and of steel sleepers at 205 tons and their life as above, the yearly requirements would then be:—For all wood sleepers 16,000,000 cu. ft.; for all cast iron, 140,000 tons; for all steel, 274,000 tons.

If the new method of preserving timber by cooking the sap under pressure, thereby preventing ebullition, proves as successful in this country as it has in America in hardening soft woods and in rendering them rot-proof, whereby our jungle woods would be brought into use, we should have no difficulty in finding enough timber in this country for all our requirements for some years to come; especially as the life of the sleepers would certainly be doubled and the waste consequently halved.

That wooden sleepers, for which all old-fashioned engineers have a sneaking regard (well expressed by No. 1 in his paper) have not altogether lost their charm in the eyes of the present generation of railway men is proved by the fact that they have been ordered for the Southern Punjab Railway, the Chairman of which is mainly responsible for the extensive use of Denham-Olphert's cast-iron plates, and the Consulting Engineer of which cannot be held altogether guiltless of the mistake (if mistake it be) of the continued use of the state steel sleepers.—*The Indian Engineer.*

## A Portable Hoist Worked by Electricity.

Messrs. Edwin Harrington, Son & Co., of Philadelphia, have recently applied the electric motor to their portable hoists, and an example of the combination is shown in the engraving. This combination greatly increases the range of application of electric power for hoisting. Naturally, the area commanded by a crane must be rather



An Electrically Operated Portable Hoist.

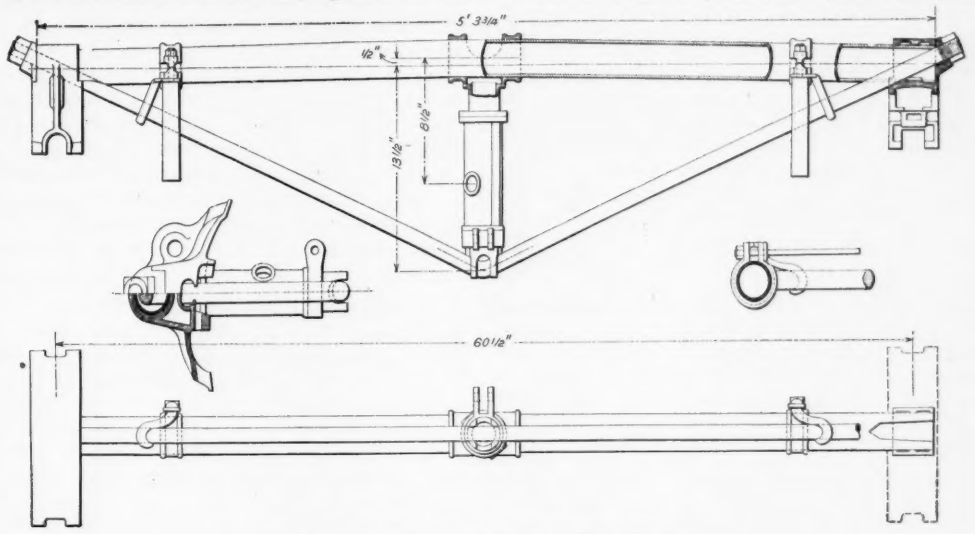
closely limited, and the new combination makes it possible to use electricity in many places which the crane cannot reach.

With this new combination there is a saving of two-thirds the labor required to lift 6,000 lbs. or 8,000 lbs. by the hand power hoist. Ten thousand pounds can be lifted with ease, and a saving of three quarters of the labor, while the gain in time is 5 to 1; that is, 10,000 lbs. can be raised at a maximum speed of 5½ ft., and lowered at the rate of 10 ft. a minute. Smaller loads can be raised faster. By means of a controller worked by the ropes on the right of the cut, the operator can vary the speed as he may desire within these limits. By this controller also, the motor is started, reversed or stopped.

The motor shown in the cut is the Storey design. It is compact, multipolar, iron clad, and not affected by surrounding machinery. It is entirely inclosed, making it dust-proof, fire-proof, and moisture-proof. Altogether, this combined electric hoist is a neat and efficient machine.

## The Reversible Interchangeable Brake Beam.

The brake beam which is shown herewith is made by the Interchangeable Brake Beam Co., of St. Louis, Mo. the President of which is Mr. J. C. Stewart, of the well-known firm of James Stewart & Co., engineers and contractors, of St. Louis, which firm has done a very large business in the last few years in erecting grain elevators, railroad buildings, docks, warehouses and mills.




The Reversible Interchangeable Brake Beam.

The main compression member (tube) of this brake beam is made of rolled steel plate; the heads, the strut and smaller parts of malleable iron. The strut is made in two swiveled pieces, and so designed as to permit the beam to be arranged right or left, as may be required. This does away with the necessity of specifying or keeping on hand more than one kind of king post, but the rigid strut is furnished if called for. When this reversible strut is in position it cannot be turned unless the truss rods are loosened to change the direction of the slot. The heads also are reversible.

This beam is interchangeable with any hollow or truss brake beam now in use, and is designed and constructed to meet all the requirements of the Master Car Builders' Association. The following test of it was made at the testing laboratory in Washington University, St. Louis, the report being signed by Prof. J. B. Johnson.

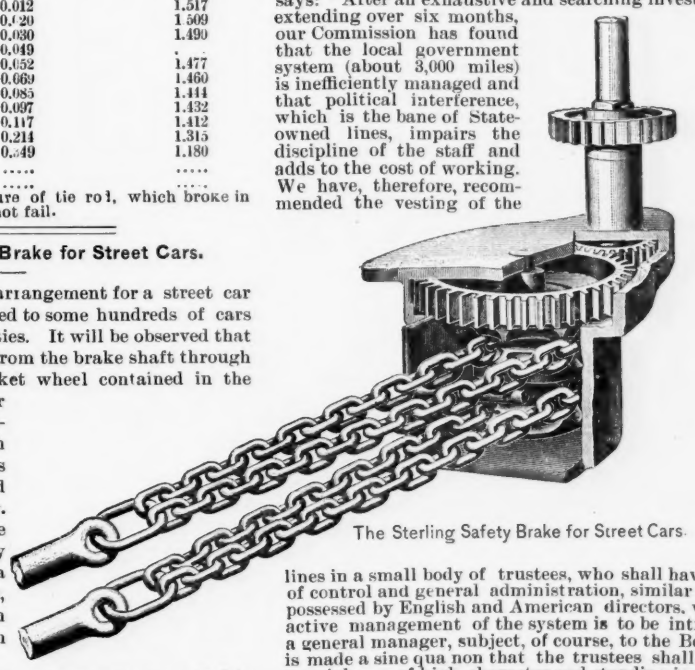
Diameter of main member, 2.41 in.; diameter of tie rod, 1.00 in.; weight of main member, 20 lbs. 13 oz.

| Loads at center. Lbs. | Deflections at center. In. | Micrometer readings. In. |
|---|---|---|
| 0 | 0.0 | 1.529 |
| 2,000 | 0.012 | 1.517 |
| 4,000 | 0.020 | 1.509 |
| 6,000 | 0.030 | 1.490 |
| 7,500 | 0.049 | . |
| 8,000 | 0.052 | 1.477 |
| 10,000 | 0.069 | 1.460 |
| 12,000 | 0.085 | 1.444 |
| 12,000 | 0.097 | 1.432 |
| 16,000 | 0.117 | 1.412 |
| 18,000 | 0.214 | 1.315 |
| 20,000 | 0.349 | 1.180 |
| 21,720 | ..... | ..... |
| *27,660 | ..... | ..... |

*Beam broke through failure of tie rod, which broke in threads. Main member did not fail.

## The Sterling Safety Brake for Street Cars.

The engraving shows an arrangement for a street car brake which has been applied to some hundreds of cars in a number of different cities. It will be observed that the motion is transmitted from the brake shaft through a gearing to a double sprocket wheel contained in the housing below the gear wheels. Around this sprocket wheel go two chains. Each of these chains is continuous and is connected to a rod leading to the break lever. The object in having the double chain is simply safety. One connection is a little longer than the other, and this one does not pull on the break lever except in an emergency.



The Sterling Safety Brake for Street Cars.

The claims made for this arrangement are: Safety, due to the double connection; increased power, owing to the introduction of the gearing; instantaneous operation, regardless of the direction in which the brake handle may be turned; reduction of lost motion by having the chains and connections the precise length required so that the brake shoes may be carried close to the wheels; less liability to breaking of the chains owing to the equal bearing for each link in the sprocket wheel; increased life of the chain, from the fact that the links are not wrapped around a rod of small diameter; maximum power obtained with a half turn of the brake wheel or handle.

The double sprocket wheel is geared to the brake post with a ratio of 7 to 3, giving a high leverage. The various parts are made of open-hearth steel, malleable iron and gun iron, and it is claimed that the construction all through is high class. This device is sold by the Sterling Supply & Manufacturing Co, of New York.

## Rapid Structural Work.

A notable example of rapid erection of structural iron and steel work, indicative of the great progress made within the past two or three years in the erection of skeleton fire-proof buildings, was afforded recently in the completion of the setting of the framework of the large Siegel-Cooper Building, Eighteenth and Nineteenth streets and Sixth avenue, New York City. The foundations for the building were delivered to the iron contractors on Nov. 1, complete. During November the owners offered the contractors a bonus in consideration of their anticipating the contract time requirements for the erection of the framework, including the roof tier complete. Notwithstanding the strike on the building, from Nov. 18 until Dec. 18, the contractors were enabled to complete the setting of the last beam, column, bolts and tie rods on the roof tier on Wednesday afternoon, Jan. 28, the time in which they were to complete this work in order to win the bonus being Feb. 1.

Excepting a portion of the columns and beams in the first tier, which were put up by hand owing to the previous incompleteness of the foundations, the work has been entirely erected by machinery, the actual working time being exactly nine weeks since the foundations were finally completed, deducting the strike period. In this time seven complete tiers of work, amounting to between 7,000 and 8,000 tons of material, have been erected.—*The Iron Age.*

## State Railroad Management in Australia.

Mr. H. R. Mackay, Commissioner of Government Railroads in Victoria, in a recent letter to Mr. Thomas P. Fowler, President of the New York, Ontario & Western, says: "After an exhaustive and searching investigation, extending over six months, our Commission has found that the local government system (about 3,000 miles) is inefficiently managed and that political interference, which is the bane of State-owned lines, impairs the discipline of the staff and adds to the cost of working. We have, therefore, recommended the vesting of the lines in a small body of trustees, who shall have powers of control and general administration, similar to those possessed by English and American directors, while the active management of the system is to be intrusted to a general manager, subject, of course, to the Board. It is made a sine qua non that the trustees shall be commercial men of high character and standing in the community, and in this way it is hoped that the place-hunting politician may be kept at bay.



"From the very nature of things, Government management of railways is weak, inert and vacillating when compared with private management. As the temper of the public will not permit the leasing of our lines, the next best thing is to create a form of independent control, which, while subject to Parliament in important matters of policy, will be strong enough to manage the system on purely business lines, without employing unnecessary men or paying extravagant wages. Our government has introduced in Parliament a bill to create the controlling body of trustees mentioned, and to effect other necessary reforms. Although it will inevitably meet with opposition from a certain class of politicians, every person in the colony with public spirit hopes to see the measurer caried."

RAILROAD GAZETTE

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## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

There is a long-standing difference of opinion as to an important question in car lighting. The greater part of the passenger cars of the United States are still lighted by kerosene lamps. The only practical improvement now in sight is by the use of compressed oil gas, on the Pintsch system. This latter improvement has made great progress in the United States as well as in other countries in the last few years. An important element in this progress has been the establishment at many points in the country of plants for making and compressing the oil gas until it has now become possible for railroad companies to procure gas at convenient intervals. Nobody has yet devised a system of electric lighting that can be considered at all practicable in reliability, convenience and economy, and the field would be left entirely clear for the extension of the Pintsch system but for the fact that there is a number of railroad men who believe that it is cheaper to buy and compress city gas than to use the Pintsch gas. Considerable study of the matter, extending over several years, has led us to think that this is a mistake, and that the Pintsch gas at the prices at which it is now sold to railroad companies is materially cheaper than compressed city gas. It would seem as if this was a question that could be quickly settled by data now accumulated, and yet conclusive data that can be compared and analyzed are not easily got at. We have recently seen the figures of some very careful studies of this subject, made by disinterested and thoroughly trustworthy experts, which show that at the prices now charged Pintsch gas will cost less than one-half as much as city gas, when necessary allowances are made for losses in illuminating power due to compression and from leakage, and when proper interest and maintenance charges are made. These figures we are not yet at liberty to publish, but hope soon to be able to do so.

We have repeatedly spoken of the intelligent use that the people of Massachusetts make of engineers in their public works. We suppose that no other state has availed itself so often and so systematically of high engineering ability and high professional character. By this we do not mean the state alone as a state, but we include also the greater municipalities within its borders. The result is that the work of the State Board of Health and the public works about Boston now furnish for the world examples of economy, efficiency and usefulness in plan and construction. It is interesting to observe the growth of the same tendency in New York City. In the last few years a number of special boards have been called to consider engineering works about that city, which have been remarkable for the high professional rank of the men engaged and for the value of their reports. In 1894 a board of unusual strength was called to consider the North River Bridge projects. This to be sure was not a municipal matter, the board having been appointed by the United States Government, but we include it in mentioning the recent notable work of this sort about New York. In 1894 a strong expert board was called to consider a report on the rapid transit project, which report had already been examined by two of the foremost engineers of the country. Last week we published a report on the Harlem River speedway, which was made by three men whose names will be rocognized as those of men high in the profession. This week we publish the report of a special board of consulting engineers on the work of the New York Dock Department, and we need say nothing of the rank of these men. All of these reports are real additions to the literature of the engineering profession. The last report is a most excellent document. It deals with a matter of great magnitude and of more than local importance; indeed, of national and international importance. It discusses questions that are not only important commercially, but which present novel and difficult engineering problems. It is a fortunate thing to have such a set of conditions brought together and discussed by a board so competent. One of the most gratifying things in this report is the unqualified endorsement of the work of the present Chief Engineer of the Dock Department. That gentleman has for 20 years or more pursued his work with such singleness of purpose and such a strong conviction that it is the business of the engineer, as of the soldier, to do his duty and not talk, that few people outside of a limited circle of engineers have any idea that he has been doing anything very remarkable; in fact we question if he himself has any such idea. It is true that his work has been recognized by, and that he has been consulted by, distinguished engineers at home and abroad; but the mass of the profession have had little idea of the importance and the difficulty of this special work, and surely the people of the city of New York have never suspected how well they have been served in this department. What we call civilization means directing human effort with patient and steady intelligence. A barbarian can work and spend money with great energy, as some cities of the United States have learned. It is the destiny of the trained professional man to extirpate the barbarian and save for society the money and energy that he wastes, and here is where the engineer comes in, whether it be in municipal work or on the railroads or in the mills and mines. Every instance of the growth of his influence is encouraging.

The case of the Buffalo Traction Co., which was mentioned in a letter concerning control of railroads in the state of New York published by us last week should be carefully watched, not only because of its direct importance and interest, but because of the influence that it may perhaps have on the State Railroad Commission of New York and on the whole question of railroad regulation by a commission in that state. This traction company proposes to build 66.6 miles of trolley railroad in the city of Buffalo. The existing lines now aggregate 146¼ miles of track, which we suppose means somewhere about 70 or 75 miles of line, as street railroad statistics are given in miles of track and not miles of road. The existing system belongs to two companies, but it is all under one management. The new lines will closely parallel those now in existence, and throughout much of their length will be within a few hundred feet of the old lines. It is proposed by the new company to have an entirely independent system, adequate in itself and self contained, and we judge that the present plan of the promoters is not to transfer with the old lines. On the lines of the Buffalo Railway Company (existing system) liberal transfers are given, and one can ride all over the lines for one fare of five cents. We do not understand that there is serious and well grounded complaint of inadequate service, although during the busy hours the cars are crowded through more or less of the distance covered. Furthermore, the Buffalo Railway Company has increased its facilities very rapidly in recent years. Between 1890 and 1895 the track mileage was increased 124 per cent., the car mileage 156 per cent., the number of cars operated 224 per cent., and the size and character of the cars was greatly improved. The number of passengers carried increased in this time about 180 per cent., and the population of the city 31 per cent. These are remarkable figures. The growth of the city itself has been phenomenal, but the growth of street railroad accommodation has been even more phenomenal. The Railroad Commissioners refuse the application of the new company for a certificate under the railroad law on the ground that the new railroad is not of public necessity. It would occupy 40 miles of streets needlessly. In the business center of the city, 14.4 miles of street out of a total of 18 would be occupied by the tracks of electric and other railroads. "Such occupation is not necessary and the burden imposed by it upon the general activities of the city might become well-nigh intolerable." The injury to the interests of the existing railroad company, which has been enterprising and has, on the whole, given satisfactory service, would be great. In weighing the evidence of the witnesses for and against the application for a charter the Board found that the applicant was at a disadvantage. Its principal witnesses are interested in the application and not otherwise interested in the city. The other witnesses "are rather of that type of character whose inclination to disturb existing conditions exceeds its ability to improve them, and whose willingness to deal with the future is greater than its proved capacity to cope with the present." The refusal of the Board to grant the certificate has stirred up a great deal of feeling, and is at the bottom of various suggestions to restrict the power of the Board or to change its character. Some of these suggestions have already taken shape in the form of bills in the State Assembly. As we said at the outset, the course of this case will be worth watching.

### Connecticut Tests of Steam and Trolley Competition.

The report of the Connecticut Railroad Commission, joined with certain antecedent statistics, enables us to supply some suggestive tests of steam trolley competition in a state where the rivalry of steam and electricity is, within certain local limits, very intense.

The report shows that the total of single track trolley mileage in the state is within a very small fraction of 300 miles, exclusive of sidings. Measurements upon the map of the state showing the trolley roads, and published a few weeks ago in these pages, indicate that of the 300 miles no less than 101 miles, or almost exactly one-third, parallel steam roads, the New York, New Haven & Hartford (the "Consolidated") road being paralleled for about 60 miles, the New England road (now under the Consolidated's control) for about 28 miles, and the Philadelphia, Reading & New England for about 13 miles.*

For the purpose of applying the tests of trolley competition in the state, the electric parallels themselves may be divided into two groups—one, the new parallels invading fresh steam railroad territory, the other represented by trolley equipment of old horse railroad parellels. Making this division we find that the 101 miles of trolley roads separate into two groups—one group represented by about 83 miles of new trolley roads, and a second group made up of electric lines for a distance of about 18 miles that were formerly operated by horse power.

Figures presented at a committee hearing during the last session of the Connecticut Legislature by the legal counsel of the Consolidated Company to depict the effects of trolley competition, enable us to measure with considerable accuracy the competitive power of these two groups of trolley parallels. While, as was to be looked for, the intensity is more marked in the cases where new trolley roads or extensions of old ones have reached out into steam railroad territory, the contrast is by no means so marked as was to be expected. The average loss of the Consolidated Company during 1895 as compared with 1894 on both groups of trolley parallels taken together was 53.6 per cent. But this was exceeded in two cases of "old" roads, that between Danbury and Bethel where the loss was 64 per cent. and between Bridgeport and Stratford where the loss was 69.9 per cent. The "old" parallels, five in number, cut the Consolidated's passenger traffic about 35 per cent. in average percentages while the "new" trolley parallels cut it about 57 per cent.—a basis of comparison which must be carefully distinguished from one based on the total number of passengers lost to the two groups. A computation by the latter test shows a loss of passengers to the "old" parallel trolleys of about 30 per cent. and of about 70 per cent. to the "new."

The new trolley parallels in many cases, however, were almost deadly as competitors of the Consolidated Company. Between Meriden and Yalesville they took away 78.1 per cent. of the traffic; between Waterbury and Naugatuck 87.5 per cent., and between Waterbury and Union City, 86.5 per cent. These percentages, it will be seen, considerably exceed the highest results of competition by the old parallels, which had a maximum of 69.9 per cent. between Bridgeport and Stratford.

More graphic figures, perhaps, of the relative power of competition by new trolley roads are supplied by the test of loss by the New Haven Company in dollars and cents. On the basis of its figures carried out for a year, its losses for the single year 1895 in Connecticut would be $32,461, of which $26,652, or a little

* The 300 miles is track, not line; but in getting up the length of parallels double track has been allowed for, and the 101 miles is a clear approximation to the length of line actually parallelled.

more than 82 per cent. was due to new trolley parallels.

The foregoing computations of a total loss for 1895 of $32,461 (representing about 339,744 passengers) have been made necessarily on a distance of about 55 miles of trolley parallels, which was the distance for which the figures were supplied to the Connecticut Legislature Committee. As there are now about 101 miles of trolley line paralleling steam roads the ratio indicates an annual loss to the steam roads in Connecticut of only about $60,000 a year, representing about 650,000 passengers. The proportion that this sum bears to the aggregate of steam railroad receipts within the state cannot even be guessed at, as the receipts are not limited by state lines. But the loss, small as it may appear absolutely, is open to a considerable increase. At present trolley parallels actually under construction, or likely to be built soon, amount to a distance of some 32 miles, of which some 16 miles will parallel the Consolidated road, six the New England and 10 the New London Northern. A gap of only about seven miles now separates the street road system of New Haven from that of Bridgeport and less than seven miles of trolley parallel—of which three will probably be built very soon—will unite the Bridgeport and Norwalk systems. New trolleys are slowly pushing through between Hartford and Middletown, between New Britain and Hartford and between Norwich and New London; all in a small state where, strangely enough, of the eighteen cities only four are now connected by trolleys—very short lines and in both cases old roads between the closely allied cities of Norwalk and South Norwalk, and Ansonia and Derby. As Norwalk and South Norwalk are practically one city as are also Ansonia and Derby, it does not strain the fact to-day that in Connecticut thus far inter-urban trolley competition has not yet been encountered by the steam companies. When it does come, unless the Consolidated Company should expand its policy of buying up street railroads, the rivalry must become more acute and its outcome even more instructive.

## Recent Improvements in the Design and Construction of Locomotives.

(*Concluded from Page* 91.)

*Cylinders.*—The improvements in locomotive cylinders outside of compounding are not radical, but they are important. The walls of the saddle are made much thicker, and in the best designs the steam pipes are separated from the exhaust pipes and from the cylinder walls, so that there may be less condensation of the steam in passing to the cylinders. This is very important where high efficiency is desired. Engines constructed in this way have given superior economy, although the per cent. of saving has not yet been determined.

*Compounding.*—The latest summary so far as we have seen, of the value of using compound cylinders on locomotives can be found in the *Railroad Gazette* of Jan. 2, in reply to a correspondent who has asked about the compounding for high speeds. It is impossible to say just what the saving in the use of compound locomotives would be, without knowing the nature of the service, but there are several general propositions that are well established.

(1.) The more a locomotive is crowded the more will be the saving from compounding.

(2.) When the steam pressure exceeds 100 lbs. per square inch, and the cut-off in the cylinder is 25 per cent. or more, the compound cylinders will show a saving which will depend on the conditions, but there will always be a saving under these conditions if the compound is properly designed. Where a single expansion locomotive is run with a steam pressure of 160 or 180 lbs., with a cut-off from 30 per cent. to 50 per cent., the compound cylinder will show a saving amounting to from 15 per cent. to 35 per cent., according to the design of compound.

(3.) Owing to the greater forcing of locomotives in freight service, it is generally found that compounding freight locomotives gives greater economy than compounding passenger locomotives. Nevertheless, it is beyond question that compounding express engines will give economy if the designing is properly done. It is a difficult matter to arrange the valve gear for high-speed compounding so as to prevent loss due to wire drawing of the steam, and choking in the passages. This has been accomplished in several instances, however, without radical changes. The essential thing is a clear understanding of the fundamental principles of high-speed steam engines.

Although there are many types so-called, of compound locomotives, yet there are only two types in common use. The only distinction between the following locomotives lies in the starting gear: Schenectady, Rhode Island, Pittsburgh, Brooks two cylinder, Richmond, Dean, Von Borries, Lindner, Mallet, Rogers, Cook, C. B. & Q., and some other examples. The difference in the starting gear really makes no difference in the efficiency of the locomotive. It mainly affects the power in starting, and, in most cases, the only difference is in the construction of the starting apparatus and in its durability. The effect in starting is practically the same for a number of these designs.

In addition to these, there are the Baldwin four-cylinder with cylinders placed one above the other, connected to the same crossheads; the Johnstone four cylinder, with the high-pressure cylinder inside of the low pressure; the Brooks tandem, with high-pressure cylinder ahead of low; and the Wolff tandem, as used on the Northern Railroad of France, with the high-pressure cylinder placed ahead or back of the low pressure.

The experience with the Brooks tandem and the Johnstone in this country is not very large, and it cannot be concluded whether these arrangements are desirable or not. The experience with the tandem on the Northern Railroad of France is very considerable, and the type is the most popular in France. There has been no experience with tandems in this country that is important. Almost invariably railroad men object to them, as the cylinders are in a position which interferes with the trucks, or where they are liable to be badly damaged in case of collisions. Furthermore, the repairs are difficult to make in all designs of tandems so far offered. However, it should be remembered that the cost of cylinder repairs on properly designed compounds of any type cannot be an important factor, when the designs of the details are reasonably well made. It has been estimated that the cost of the entire cylinder repairs of a locomotive averages about 3 per cent. of the total cost of repairs; and if it should be doubled the additional cost would be only about 3 per cent. of the total repairs. As locomotive repairs average about $1,000 a year, the additional cost for repairing compound cylinders, even if it were double that of simple, would be but $30. This would be saved in fuel in a short time if the conditions were favorable to compounding.

In selecting a compound type, one is confined in this country to two styles; the Vauclain four-cylinder and the two-cylinder types. Both of these types have their enthusiastic advocates, but the Vauclain is considerably more used, and has given reasonable satisfaction. In several instances the two-cylinder type has given excellent results, but for large locomotives the dimensions of the low-pressure cylinder, when made as great as they should be, meet some objection, as the pistons are heavy, and the cylinders project rather too much at the sides. The diffculties incident to adjusting the valve gear and arranging the receivers in the smokebox, and balancing the slide valves in two-cylinder compounds are not found in the four-cylinder compounds. By using the piston valve on the two-cylinder compound, some of the difficulties in steam distribution are removed, but it is more difficult to arrange the steam distribution in two-cylinder compounds than in the four-cylinder type. Another advantage of the four-cylinder engine, whether of the tandem, Johnstone, or Vauclain type, lies in the superior starting power which these engines possess, owing to the fact that the apparatus is an exact duplication on two sides of the engine.

*Pistons.*—The reduction of the weight of pistons and cross-heads and reciprocating parts is so important that it is now considered essential by all railroad managers who watch their track. It is hard to maintain a good track with a 70-lb. rail, with the old-fashioned heavy reciprocating parts and small driving wheels. The modern improved piston is made of wrought-iron or cast-steel, very thin, and weighing not more than half of the old cast-iron forms. In the *Railroad Gazette* in the past two years many illustrations have been given of these improved pistons.

*Cross-heads* —The principle change in cross-heads is toward larger wearing surfaces, and lighter construction. The old form of Laird type of cross-heads has been abandoned, as the increase in the forcing of locomotives and the increased speeds developed the defects of this design which show themselves principally in broken piston rods.

*Driv ng Wheels and Counterbalancing.*—The increase in speeds and in the size of cylinders in the last five years have developed serious defects in counterbalancing in the old designs and many of the older engines are unsafe to run at the common speeds. Many consolidation, 10-wheel and 8-wheel engines that would not damage the track at the maximum speed used five years ago would bend the rails if run at the maximum speeds of this day. For this reason the diameters of the driving wheels have been increased. This increase reduces materially the effect of the counterbalance on the track. It is not to be expected that for slow, heavy work up grades, a large driving wheel will be quite as satisfactory as a small one, but for road engines, hauling trains at a fair average speed, the difference in the diameter of the driving wheel makes but very little difference in the hauling power of the engines, after the train is started. A 5½ ft. wheel on a 10-wheel or mogul locomotive does very well in freight service, and a 7-ft. wheel on a passenger locomotive is desirable for many reasons. Of course, these are sizes that are sometimes hard to reach in the limits of design, but as nearly as possible the wheels should be made of these sizes. The Pennsylvania Railroad has abandoned the use of small wheels on freight engines, after having a very large experience with small drivers.

There is no difficulty in counterbalancing a locomotive so that it will ride easily, and be comfortable for the engineer and fireman, and for the passengers in the train. The rules for this are given in all the mechanical text books of any importance; but to balance a locomotive so that it will not damage the track is a different thing, and one that has not been considered so completely as it should be in text books. The best arguments on this subject are found in the *Railroad Gazette* of the last three years. The sum of the experience and argument is that the pistons, piston rods, cross-heads and main rods must be made as light as possible, regardless of expense; and, further, the diameter of the driving wheels must be increased as much as possible. When these things are accomplished, nothing remains to keep down the maximum speed of the engines.

*Steam Pressures.*—For compound locomotives, it is advantageous to go to 200 lbs. steam pressure, but care should be exercised in designing slide valves for such pressures; it is preferable to use piston valves. For single expansion engines it is not desirable to run above 160 lbs. pressure in so far as economy is concerned, as there will be no greater efficiency in the cylinders with 200 lbs. than with 160, on single expansion locomotives. It is frequently an advantage in point of capacity of a locomotive boiler in tight places to have a higher steam pressure, and it is well to build locomotive boilers for single expansion engines capable of carrying 200 lbs. pressure, so that the higher pressure may be carried when desired, to overcome steep grades or in taking an extra heavy train in bad weather; but if a locomotive engineer wishes to make a record for fuel saving, he will find no advantage in maintaining the pressure at 200 instead of 160 lbs. Another reason for building locomotive boilers to take 200 lbs. pressure is that it might be desired during the life of the engine to change to compound cylinders.

*Smokebox Apparatus.*—The wide variation in smokebox apparatus and smoke stacks on different railroads shows that there is no concerted opinion as to the best arrangement. There is a lack of facts regarding the performance of the different types of construction, and so much contradictory evidence has been offered that it is impossible to draw conclusions. The Committee appointed by the Master Mechanics Association has shown that the smoke stack base should flare out considerably, so as to make an easier approach for the gases into the smoke stack; also it is shown that the exhaust nozzle should be placed quite low in the smokebox. Many are getting good results with a petticoat pipe placed over the exhaust nozzles, and there are several forms of deflector plates showing various improvements, among them, one with perforations. It is concluded by most railroad men that there is no advantage in an exceedingly long smokebox, and the Master Mechanics Committee has recommended that the smokebox be no longer in front of the cylinder saddle than is necessary to get in a proper cylinder pocket. The old form of diamond stack, with netting at the top has been abandoned on most roads. A few are using it, however, with pretty good success. It seems to be useful as a spark arrester, and this all concede. But it is believed that a proper arrangement of netting within the smokebox is an equally good spark arrester, and will give an equally good draught. One reason for the return to the diamond stack on the part of some designers is that they have not had a proper design of netting, exhaust nozzles, and deflector plates inside of the smokebox.

*Tenders.*—After considerable changing to and fro, the majority of locomotive builders and railroads are returning to a rolled channel, or I-beam, tender frame in the place of wood, as repairs are less, and the strength is much greater. Recently, there has been a change toward 6-wheel tenders of the English type. The object is to obtain a simple construction underneath the tank, that can be inspected quickly. There is no doubt that the 6-wheel tender is simpler than tenders with 4-wheel trucks. However, railroad men having rough sections of track are not willing to use the 6-wheel tender, as they fear derailments. It can-

not be said yet that the 6-wheel tender is the popular type.

*Selections of Materials.*—Formerly material for locomotives was purchased on its reputation, not only by railroads, but by builders, but competition has driven locomotive builders to buy material solely on test. The price paid for locomotives is so exceedingly small that the only way in which locomotive builders can make themselves whole is to purchase material according to quality. They cannot afford to pay a fancy price for material which has a high reputation. The larger locomotive builders have established complete testing departments and chemical laboratories and inspection bureaus, so that all material is inspected and tested before being used. This has proved to be the only plan that will give safety to a locomotive builder where material is to be guaranteed. The surprising number of defects in material, even when it is bought at a fancy price and with a high reputation, warrants the maintenance of such laboratories. Contrary to the former attitude, locomotive builders now encourage specifications containing tests of material, and encourage railroads to send their own inspectors. This has been brought about by the stringent specifications required by railroads which make close inspection necessary, and locomotive builders are glad to avail themselves of the assistance of railroad inspectors.

*Other Improvements.*—Outside of the improvements mentioned, there have been less important ones, such as the decided increase in the area of bearings for driving axle journals and connecting and parallel rods. The use of steel in place of cast iron to reduce weight is an important change, and a necessary one where the weight is limited and the service hard, for the saving in weight from the use of cast steel permits a larger boiler. No important changes have been made in the construction of link motions and many other details. The valve travel has, however, been increased, as well as the outside lap, and the inside of the valve has been cut out to give what is called inside clearance which materially reduces the back pressure and frequently increases very considerably the power of a locomotive.

*Ten-Wheelers or Moguls.*—The only important difference between 10-wheelers and moguls lies in the trucks. The mogul has the advantage of the shorter main rod, while the 10-wheeler has longer flues. The 2-wheel or 4-wheel truck question has been much discussed. The conclusion seems to be that the 2-wheel truck is just as safe as the 4-wheel truck when both are equally well designed. Many moguls are running in fast passenger service and the liability to derailment seems to be fanciful rather than actual. This is the experience of the Chicago, Burlington & Quincy, and a number of important roads. There is practically no choice, so far as safety is concerned, if one takes the evidence of men who are using both types of locomotives. Of course, it appears from pure reasoning that a 10-wheeler, with a 4-wheel truck, is safer. Inasmuch as the tubes are longer, and as the main rod need not be of an objectionable length, probably the 10-wheeler has the least objections, and some advantages.

## Train Accidents in 1895.

We present herewith our usual tabular summaries of the train-accident records published in the *Railroad Gazette* from month to month during the year, and we have the pleasure of recording much the smallest number of passengers killed since 1881, and probably the smallest number since we began to keep the records (previous to 1882 the passengers and employees were not separated). The year 1894 showed a marked improvement over all previous years (1893 being in fact one of the worst records ever published); but previous to that every year showed from three to five times as many fatalities to passengers as we now record. In the seven years, 1887-1893, the average number of passengers killed in train accidents yearly was 161. The number of passengers reported *injured* does not decrease in such a gratifying way; but as we have often pointed out, the reports of injuries, made up by hundreds of different reporters with such a variety of ways of estimating the importance of a person's hurts in an accident, cannot be compared to any intelligible standard, and we do not dare to use the totals with any idea of making close comparisons.

It would be of interest to compare the casualties to passengers with the volume of passenger traffic, as is done in the Massachusetts, the Interstate Commerce and the English statistics, but the passenger mileage is nowhere reported for the whole country for the calendar year. Estimating it at 14 billions, a figure between that of Poor, whose fiscal years end variously, and that of the Interstate Commerce Commission for the year to June 30, 1894, there would be one passenger killed to every 368 million passenger miles. The last report of the Interstate Commission (to July 1, 1894) showed one passenger killed in train accidents to about 88 million passenger miles. (That year included nine bad accidents.) Even the improved record of 1895 is still far short of what we find on the railroads of England. In the whole United Kingdom in 1894 there were 16 passengers killed in train accidents, and there were probably 1,600 million journeys. If the journeys averaged 10 miles each, the passenger mileage would be 16,000 millions, making the ratio 1 killed to 1,000 millions of passenger miles.*

If we adhere to our custom of mentioning in this annual summary only those accidents of unusual importance we shall mention none at all, for there was none during the entire year that caused the death of as many as five passengers. Thirteen persons were killed in the rear collision at Craig's Road, Que., July 9, but accidents outside of the United States do not come within our record. But, as every railroad man knows, and as will have been apparent to any one reading the monthly accounts, serious accidents, with possibilities of great disaster still occur frequently, and many lessons of former years have been re-enforced by startling object lessons in the course of 1895; and the smallness of the list of fatalities seems in many cases to have been due to special good fortune. Passenger trains fully equipped with vestibules are, however, now quite common and there have been a number of derailments and collisions in which the fact that the car bodies were thus firmly braced against each other was clearly an important factor in mitigating the destructiveness of the shock.

laneous derailments due to negligence in operating. Some of this class of accidents are due to defects in hose, but none of that kind appear in this record. Derailments due to purposely misplaced switches have been included during the past year under the head of malicious obstructions, and the whole table has been condensed accordingly. In like manner cylinder explosions, which rarely do harm and generally are not reported in print at all, have been dropped as a separate class, and cases worthy of note are included under miscellaneous breakages of rolling stock.

The total number of casualties to persons recorded during the past six years is shown by years in the following table:

| | 1895. | 1894. | 1893. | 1892. | 1891. | 1890. |
|---|---|---|---|---|---|---|
| Pass'rs killed | 38 | 58 | 178 | 116 | 177 | 172 |
| Emp. killed | 302 | 280 | 424 | 490 | 550 | 569 |
| Others killed | 75 | 104 | 89 | 66 | 63 | 65 |
| Total killed | 415 | 442 | 691 | 672 | 790 | 806 |
| Pass'rs injured | 701 | 410 | 1,240 | 1,128 | 1,183 | 1,224 |
| Emp. injured | 739 | 845 | 1,043 | 1,205 | 1,447 | 1,519 |
| Others injured | 95 | 88 | 101 | 74 | 55 | 69 |
| Total injured | 1,535 | 1,343 | 2,584 | 2,407 | 2,685 | 2,812 |
| Train mileage, millions* | | 8 8.4 | 889.4 | 864.9 | 831.2 | 793.9 |
| No. person killed per million train miles | | 0.510 | 0.777 | 0.777 | 0.950 | 1.015 |

* Train mileage is taken from Poor's Manual, which given revenue mileage only.

TABLE NO. 1—TRAIN ACCIDENTS—THEIR NATURE AND CAUSES, FOR TWENTY THREE YEARS.

| | 1895. | 1894. | 1893. | 1892. | 1891. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884. | 1883. | 1878-82. † | 1873-77. ‡ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Train Mileage in U. S. in millions of train-miles* | 825 | 818.4 | 889.4 | 864.9 | 831.2 | 793.9 | 722.0 | 688.8 | 644.0 | ..... | ..... | ..... | ..... | ..... | ..... |
| Collisions: | | | | | | | | | | | | | | | |
| Rear | 301 | 280 | 455 | 485 | 555 | 495 | 379 | 404 | 362 | 338 | 316 | 280 | 413 | 275 | 153 |
| Rutting | 109 | 131 | 223 | 251 | 284 | 323 | 260 | 311 | 309 | 127 | 120 | 138 | 178 | 121 | 96 |
| Crossing and miscellaneous | 192 | 199 | 318 | 326 | 298 | 223 | 110 | 89 | 29 | 36 | 28 | 27 | 39 | 21 | 44 |
| Total collisions | 602 | 613 | 996 | 1,062 | 1,137 | 1,041 | 749 | 804 | 700 | 501 | 464 | 445 | 630 | 417 | 295 |
| Derailments: | | | | | | | | | | | | | | | |
| Broken rail | 41 | 32 | 71 | 63 | 53 | 38 | 32 | 61 | 50 | 45 | 102 | 60 | 84 | 48 | 71 |
| Loose or spread rail | 16 | 35 | 57 | 53 | 68 | 44 | 28 | 42 | 31 | 81 | 65 | 68 | 88 | 34 | 31 |
| Broken bridge or trestle | 16 | 23 | 20 | 30 | 42 | 38 | 42 | 40 | 39 | 20 | 32 | 34 | 35 | 27 | 24 |
| Broken or defective switch | 9 | 16 | 41 | 26 | 38 | 33 | 10 | 29 | 23 | 7 | 13 | 9 | 12 | 3 | 9 |
| Broken or defective frog | 5 | 5 | 16 | 11 | 11 | 12 | 7 | 16 | 7 | 20 | 11 | 11 | 7 | 2 | 5 |
| Other defects of road | 8 | 3 | 9 | 8 | 2 | 2 | 1 | 1 | 2 | 1 | ..... | ..... | 1 | 2 | 9 |
| Total defects of road | 95 | 114 | 214 | 191 | 214 | 167 | 120 | 189 | 152 | 174 | 223 | 182 | 227 | 116 | 149 |
| Broken wheel | 33 | 33 | 48 | 46 | 39 | 37 | 28 | 48 | 27 | 37 | 41 | 22 | 40 | 28 | 22 |
| Broken axle | 70 | 71 | 88 | 56 | 66 | 59 | 48 | 44 | 45 | 62 | 48 | 30 | 60 | 36 | 32 |
| Broken truck | 20 | 18 | 31 | 28 | 38 | 23 | 20 | 27 | 8 | 14 | 18 | 12 | 24 | 11 | 10 |
| Failure of coupling or drawbar | 17 | 27 | 29 | 27 | 20 | 7 | 5 | 7 | 4 | 3 | 6 | 3 | 2 | 1 | 4 |
| Fall of brakebeam | 14 | 10 | 19 | 23 | 27 | 12 | 9 | 9 | 10 | 6 | 10 | ..... | ..... | ..... | 3 |
| Other defects of equipment | 23 | 23 | 26 | 26 | 25 | 18 | 10 | 13 | 6 | ..... | ..... | ..... | 3 | 3 | 5 |
| Total defects of equipment | 177 | 182 | 241 | 206 | 215 | 158 | 120 | 148 | 100 | 122 | 123 | 67 | 129 | 79 | 76 |
| Misplaced switch | 48 | 53 | 67 | 98 | 78 | 54 | 54 | 70 | 49 | 68 | 55 | 82 | 89 | 77 | 76 |
| Derailing switch | 7 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Negligence of trackmen or bridgemen | 8 | 6 | 14 | 5 | 16 | 8 | 10 | 3 | 4 | 4 | 4 | 2 | 9 | 5 | 9 |
| Runaway engine or train | 8 | 1 | 4 | 1 | 9 | 19 | 8 | 14 | 6 | 2 | ..... | 3 | 1 | 2 | 2 |
| Open draw | 3 | 4 | 4 | 3 | 3 | 5 | 1 | 4 | 3 | 2 | 5 | 5 | 4 | 3 | 4 |
| Other negligence | 17 | 39 | 48 | 57 | 38 | 22 | 19 | 26 | 12 | ..... | ..... | 2 | 9 | 4 | 6 |
| Total negligence in operating | 91 | 103 | 137 | 164 | 144 | 108 | 92 | 117 | 74 | 76 | 64 | 94 | 112 | 91 | 97 |
| Animals on track | 21 | 38 | 50 | 51 | 61 | 56 | 41 | 57 | 32 | 36 | 25 | 28 | 45 | 39 | 48 |
| Snow or ice | 16 | 12 | 16 | 7 | 6 | 6 | 5 | 22 | 6 | 27 | 30 | 7 | 13 | 13 | 20 |
| Washout | 17 | 5 | 16 | 19 | 19 | 18 | 20 | 19 | 11 | 23 | 22 | 25 | 25 | 21 | 28 |
| Landslide | 35 | 31 | 27 | 30 | 28 | 28 | 24 | 34 | 16 | 21 | 7 | 18 | 16 | 7 | 6 |
| Accidental obstruction | 23 | 19 | 32 | 29 | 20 | 28 | 8 | 20 | 31 | 17 | 17 | 42 | 53 | 32 | 38 |
| Malicious obstruction | 40 | 62 | 51 | 35 | 53 | 45 | 25 | 36 | 24 | 39 | 28 | 29 | 28 | 13 | 15 |
| Other unforeseen obstructions | 2 | 11 | 5 | 8 | 5 | 13 | 8 | 5 | 9 | 4 | 6 | 3 | 19 | 3 | 3 |
| Total unforeseen obstructions | 154 | 178 | 197 | 179 | 192 | 194 | 131 | 193 | 109 | 167 | 135 | 152 | 198 | 128 | 158 |
| Others | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 7 | ..... | ..... | ..... | ..... | 1 | 5 |
| Unexplained | 293 | 296 | 423 | 425 | 439 | 377 | 296 | 385 | 243 | 102 | 136 | 186 | 259 | 231 | 224 |
| Total derailments | 810 | 873 | 1,212 | 1,165 | 1,204 | 1,004 | 759 | 1,032 | 705 | 641 | 681 | 681 | 926 | 646 | 709 |
| Accidents without collision or derailment: | | | | | | | | | | | | | | | |
| Boiler explosions | 12 | 9 | 24 | 19 | 19 | 21 | 13 | 15 | 14 | 19 | 11 | 16 | 13 | 14 | 10 |
| Broken parallel or connecting rod | 10 | 12 | 8 | 10 | 8 | 9 | 5 | 22 | 17 | 22 | 28 | 17 | 26 | 14 | 10 |
| Cars burned while running | 17 | 16 | 18 | 15 | 19 | 15 | 4 | 7 | 8 | 8 | 9 | 13 | 13 | 8 | 9 |
| Various breakages of rolling stock | 8 | 10 | 18 | 10 | 28 | 27 | 21 | 22 | 35 | 8 | 17 | 15 | 28 | 9 | 16 |
| Other causes | 28 | 27 | 31 | 38 | 26 | 29 | 18 | 33 | 12 | 12 | 7 | 4 | 4 | 1 | 6 |
| Total without collision or derailment | 75 | 74 | 99 | 100 | 103 | 101 | 61 | 99 | 86 | 69 | 72 | 65 | 84 | 46 | 51 |

RECAPITULATION.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Collisions | 602 | 613 | 996 | 1,062 | 1,137 | 1,041 | 749 | 804 | 700 | 501 | 464 | 445 | 630 | 417 | 295 |
| Derailments | 810 | 873 | 1,212 | 1,165 | 1,204 | 1,004 | 759 | 1,032 | 705 | 641 | 681 | 681 | 926 | 646 | 709 |
| Other accidents | 75 | 74 | 99 | 100 | 103 | 101 | 61 | 99 | 86 | 69 | 72 | 65 | 84 | 46 | 51 |
| Total | 1,487 | 1,560 | 2,307 | 2,327 | 2,444 | 2,146 | 1,569 | 1,935 | 1,491 | 1,211 | 1,217 | 1,191 | 1,640 | 1,109 | 1,055 |

* Train mileage is taken from Poor's Manual, which gives *revenue* mileage only; that for 1895 is estimated.
† Average per year, for five years, 1878 to 1882, inclusive.
‡ Average per year, for five years, 1873 to 1877, inclusive.

In February, 1895, the number of persons killed was the smallest reported for many years except in two months, April, 1890, and February, 1894. In June, 1895, only 28 passenger trains were involved in the accidents reported, the smallest number for many years. Only twice within the last five years have we found less than 35 passenger trains affected.

Among the accidents which, though not remarkably fatal, were notable for various reasons, were those at Liberty Park, N. J., reported in the *Railroad Gazette* of Aug. 30, Woodlawn, N. Y., reported Oct. 11; Hyde Park, Mass., Nov. 8; Rome, N. Y., Nov. 22, and Preble, N. Y., Dec. 6.

Table No. 1 is self-explanatory. Accidents due to the too quick application of air-brakes on freight trains have now come to be quite common. Most of these are of minor consequence and do not appear on our record, but we recall at least four cases in 1895 which caused serious collisions. These are included under miscel-

* English passenger miles can only be guessed at; the number of journeys may be less and the average length of each may be less than here stated.

The relative frequency of the more prominent causes of collision for seven years past is shown in the following table:

| | 1895. | 1894. | 1893. | 1892. | 1891. | 1890. | 1889. |
|---|---|---|---|---|---|---|---|
| Train breaking in two | 96 | 88 | 118 | 101 | 96 | 65 | 82 |
| Misplaced switch | 42 | 50 | 80 | 90 | 78 | 90 | 59 |
| Failure to give or observe signals | 64 | 54 | 108 | 140 | 153 | 82 | 58 |
| Mistake in giving or understanding orders | 35 | 31 | 67 | 78 | 88 | 73 | 46 |
| Miscellaneous | 117 | 166 | 240 | 261 | 259 | 243 | 150 |
| Total explained | 354 | 389 | 613 | 610 | 674 | 553 | 395 |
| Unexplained | 248 | 224 | 383 | 452 | 463 | 488 | 354 |
| Total | 602 | 613 | 996 | 1,062 | 1,137 | 1,041 | 749 |

In reading the tables contained in this article the reader must bear in mind that most of the facts for the record are taken from the daily newspapers, and that the causes are given as gathered from such accounts; though all accidents of peculiar importance are inquired into. Those in which no person is killed or injured are not published with date, locality, etc., as was formerly our custom, but they are included in the tabular statistics.

Accidents on street railroads, all of them on electric lines excepting a very few on cable lines, have been numerous during 1895, as might have been expected from the great increase in the number of such roads and the amount of business done by them. In our monthly accounts for 1895 we have mentioned 117 accidents in which 45 persons were killed and 298 injured, as compared with 61 accidents, 8 killed and 100 injured in 1894. It is true that a number of these accidents have been collisions with steam locomotives; sometimes the locomotive ran into the street car and sometimes it was the other way; but, although it may look like siding with the upper dog in the fight, to class all these as street car accidents, and charge no part of the fault upon the steam locomotive, it will probably be substantially just to do so. The number of persons injured on electric street roads is liable to be shown too small if confined to the car accident record, for every now and then there is a runaway where passengers jump off and get hurt, while the car remains on the track and comes out undamaged. There was a case of this kind in July, in which 50 persons jumped off a car and were reported as all more or less injured. Passengers cannot be blamed for getting scared, and these injuries are really due to the cause that produces the runaway, but such cases cannot be classed as accidents to cars. In Pittsburgh, in October, 5 passengers were killed or fatally injured in a runaway accident, and in Cleveland in November a car fell into the river and killed 15 passengers. Even omitting these two cases the number of killed is still several times larger than in 1894.

TABLE NO. 2.—CASUALTIES TO PASSENGERS AND EMPLOYEES IN TRAIN ACCIDENTS IN 1895.

*Tabulated according to classes of causes.*

| Month. | Defects of road. | | | | Defects of equipment. | | | | Negligence in operating. | | | | Unforeseen obstructions and maliciousness. | | | | Unexplained. | | | | Total. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pass. | | Emp. | | Pass. | | Emp. | | Pass. | | Emp. | | Pass. | | Emp. | | Pass. | | Emp. | | Pass. | | Emp. | |
| | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. | Killed. | Injured. |
| January | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 14 | 16 | 31 | 0 | 0 | 5 | 10 | 2 | 30 | 1 | 12 | 4 | 45 | 23 | 54 |
| February | 0 | 12 | 1 | 8 | 0 | 2 | 2 | 2 | 0 | 20 | 4 | 35 | 0 | 0 | 1 | 12 | 2 | 10 | 5 | 15 | 2 | 44 | 13 | 75 |
| March | 0 | 5 | 0 | 2 | 0 | 3 | 6 | 9 | 0 | 4 | 8 | 38 | 2 | 6 | 4 | 9 | 0 | 0 | 3 | 3 | 2 | 19 | 21 | 61 |
| April | 0 | 9 | 1 | 5 | 0 | 1 | 2 | 5 | 0 | 5 | 5 | 28 | 0 | 1 | 6 | 7 | 3 | 5 | 3 | 1 | 3 | 21 | 17 | 50 |
| May | 1 | 26 | 2 | 6 | 2 | 3 | 2 | 8 | 0 | 33 | 8 | 32 | 0 | 0 | 0 | 9 | 0 | 0 | 4 | 7 | 3 | 62 | 16 | 62 |
| June | 0 | 3 | 2 | 4 | 0 | 0 | 2 | 2 | 0 | 10 | 9 | 31 | 2 | 0 | 9 | 3 | 0 | 4 | 0 | 0 | 2 | 17 | 22 | 51 |
| July | 0 | 0 | 2 | 7 | 0 | 0 | 2 | 4 | 1 | 19 | 6 | 24 | 0 | 0 | 1 | 5 | 0 | 0 | 5 | 8 | 1 | 19 | 16 | 48 |
| August | 1 | 0 | 2 | 7 | 0 | 0 | 2 | 3 | 3 | 52 | 14 | 26 | 2 | 14 | 4 | 3 | 2 | 12 | 8 | 2 | 8 | 78 | 30 | 41 |
| September | 0 | 0 | 1 | 9 | 0 | 10 | 3 | 8 | 2 | 77 | 13 | 31 | 0 | 12 | 6 | 4 | 0 | 15 | 2 | 1 | 2 | 114 | 25 | 53 |
| October | 0 | 10 | 0 | 11 | 0 | 3 | 2 | 10 | 3 | 44 | 25 | 35 | 0 | 5 | 5 | 9 | 0 | 35 | 8 | 8 | 3 | 97 | 40 | 73 |
| November | 0 | 23 | 1 | 2 | 2 | 25 | 5 | 4 | 2 | 29 | 23 | 60 | 0 | 0 | 4 | 15 | 0 | 1 | 5 | 6 | 4 | 78 | 38 | 87 |
| December | 0 | 16 | 3 | 7 | 0 | 5 | 2 | 3 | 4 | 71 | 26 | 44 | 0 | 5 | 1 | 14 | 0 | 10 | 9 | 16 | 4 | 107 | 41 | 84 |
| Year | 2 | 106 | 16 | 69 | 4 | 52 | 30 | 73 | 17 | 378 | 157 | 415 | 6 | 43 | 46 | 100 | 9 | 122 | 53 | 82 | 38 | 701 | 302 | 739 |
| Year, 1894 | 3 | 33 | 23 | 70 | 5 | 19 | 24 | 56 | 127 | 202 | 136 | 462 | 16 | 95 | 61 | 145 | 7 | 61 | 36 | 112 | 58 | 410 | 280 | 845 |
| Year, 1893 | 15 | 336 | 32 | 121 | 3 | 64 | 47 | 75 | 52 | 634 | 243 | 742 | 1 | 56 | 156 | 167 | 7 | 150 | 46 | 138 | 178 | 1,240 | 424 | 1,243 |
| Year, 1892 | 23 | 322 | 39 | 103 | 2 | 85 | 61 | 93 | 178 | 514 | 271 | 718 | 5 | 88 | 72 | 177 | 8 | 117 | 47 | 113 | 116 | 1,126 | 490 | 1,204 |
| Year, 1891 | 24 | 291 | 45 | 101 | 7 | 90 | 42 | 65 | 114 | 458 | 345 | 939 | 23 | 116 | 57 | 154 | 9 | 228 | 61 | 188 | 177 | 1,183 | 550 | 1,447 |
| Year, 1890 | 19 | 195 | 61 | 126 | 4 | 86 | 30 | 77 | 15 | 624 | 337 | 959 | 24 | 103 | 60 | 165 | 10 | 216 | 85 | 192 | 172 | 1,224 | 569 | 1,519 |
| Year, 1889 | 16 | 167 | 30 | 81 | 7 | 58 | 24 | 63 | 46 | 291 | 189 | 595 | 34 | 107 | 53 | 120 | 5 | 122 | 40 | 119 | 108 | 745 | 346 | 978 |
| Year, 1888 | 5 | 195 | 45 | 153 | 16 | 65 | 35 | 92 | 92 | 388 | 217 | 573 | 11 | 106 | 77 | 163 | 44 | 258 | 60 | 117 | 168 | 1,012 | 434 | 1,098 |

## NEW PUBLICATIONS.

*The Digest of Physical Tests and Laboratory Practice.* Résumé of Practical Tests made in the laboratories of the World Philadelphia: Frederick A. Riehlé, 1424 North Ninth street. Quarterly; single copies 30 cents, $1 a year.

The first number of the quarterly issue of the Digest of Physical Tests is received. It is a magazine of 86 pages with a long table of contents. There are articles by Professor Johnson, Mr. A. P. Boller, Mr. J. F. Holloway and others whose names are well known. A good many of the articles are reprints, but a considerable number are original. Professor Johnson has a general article on the New Science of Testing Materials. Mr. A. S. Cooper writes on Tests of Cement Mortar Mixed with Various Kinds of Sands. Professor Thomas Gray describes an autographic testing machine attachment. Mr. H. M. Norris gives elementary information on testing cement.

*Alternating Electric Currents.* By Edwin J. Houston, Ph. D., and A. E. Kennelly, Sc. D. New York: The W. J. Johnston Company. 225 pages, 77 illustrations. Price $1.

This is a clear and comprehensive statement of the present state of the art in the field of alternating electric currents, and it goes far to correct the old superstition that the treatment of an involved scientific matter cannot be popular without becoming non-scientific. One must stand on a high plane, as the well-known authors do, to select, as they have done, just the necessary, avoid discussion of the doubtful, and survey briefly and comprehensively the actual achievements to date. These last are of interest to those whose calling makes electricity to them a secondary matter, yet one of sufficient importance to keep in touch with, even if they cannot take the time to inform themselves with minute accuracy.

## TRADE CATALOGUES.

*The Chicago Drainage Canal.* The Ingersoll-Sergeant Drill Co., Havemeyer Building, New York City, 1896.

It is so common nowadays to find trade catalogues and other advertisements of a similar nature filled with fine illustrations that they do not attract the attention that they would have done some years ago. But it is seldom that we find one as well illustrated as the little pamphlet just published by the Ingersoll-Sergeant Drill Co., containing numerous views of the Chicago Drainage Canal in course of construction. The company chooses this piece of work as the subject of its catalogue from the fact that there have been used upon the canal 34 Ingersoll-Sergeant channelers, 129 Ingersoll-Sergeant rock drills and 7 air compressors, making in all 170 machines of the company's make. Besides showing the great part that the machines of this company have taken in the construction of the work many interesting figures are presented concerning the ingenious contrivances used to cheapen the cost of excavation. An instance of this is the Brown cantilever hoist, a balanced steel frame truss 342 ft. long, used by the contracting firm on section 10, which machine removes about 600 cu. yds. a day. Another efficient device for the same purpose is the traveling cableway of the Lidgerwood Company, consisting of a main wire cable suspended from two movable towers about 700 ft. apart, the operating machinery being placed at the base of one of these towers. The load is supported from a carriage traveling on the main cable and is controlled by ropes leading to the engine. Five hundred cubic yards a day is the average work of this machine. In addition to these devices combinations of portable derricks and movable inclines were used and a novel form of traveler having two booms and carrying four skips.

One of the most conspicuous features of work on the canal has been the application of compressed air for various purposes. In addition to the use of air for rock drilling it has been used to work drainage pumps and small hoisting engines.

The use of the channelers on the work arose from the fact that the specifications require the side walls to be formed by channels made in one to three cuts by channeling machines. This, of course, is where the line of the canal passes through rock. When the excavation was wholly through earth the bank of the canal formed a 2 to 1 slope, no masonry being used. The canal is designed for an ultimate flow of 600,000 cu. ft. per minute.

An interesting feature of the pamphlet is the record of use of rock drills, channelers, etc., on various parts of the work. For instance, Mason & King, on section 8, used a duplex compressor having 20 × 36 in. air cylinders, 18 × 36 in. steam cylinders for more than a year, having no delay or stoppage during that whole time. During the months of June and July, 1894, this machine did the drilling for the excavation of 147,085 cu. yds. of rock and furnished power for the pumps on two-thirds of the section, consuming during that time only 334 tons of Illinois coal. On section 7, of 12 Ingersoll-Sergeant drills, each drill made a daily average of 70 lineal feet. On section 9 seven Ingersoll-Sergeant channelers made a daily average of 94 sq. ft. for each machine for seven months, all cuts 12 ft. deep. Fifteen drills during the same period made a daily average of 82 ft. each. For six months ending Nov. 30, 1894, a total of 194,880 lin. ft. of holes was drilled on this section, which is about 2 cu. yds. of rock excavated per 1 lin. ft. of hole drilled, the entire amount removed being 380,400 cu. yds. during that time. The seven channelers used on section 14 have made a daily average of 110 sq. ft. of channel each, which includes all the time lost in moving, laying track, repairing etc.

A few figures showing the consumption of fuel in rock excavation, using improved machinery, are given from section 8 during the months of June and July, 1894:

| | |
|---|---|
| Cost of Illinois bituminous coal delivered, per ton | $1.70 |
| Amount of coal used | 333¼ tons |
| Total cost | $566.78 |
| Number of cubic yards of rock excavated during this period | 147,085 |
| Coal per cubic yard excavated | 4½ lbs. |

*Standard Boilers.* The Standard Boiler Co., 1120 and 1121 Marquette Building, Chicago, 1896.

This is a well illustrated catalogue showing the Standard boiler in various states of construction, and containing among other views, one of the 4,000 H. P. plant of the North Chicago Street Railroad Co., which is fitted with Standard boilers. The boiler is classed as a water-tube safety boiler, and presents the admirable feature of having only straight tubes, a feature the value of which is not always recognized by designers of water-tube boilers. In addition to the illustrations the catalogue contains a number of testimonials from those who have used the boiler, and a view of the works of the Link Belt Machinery Co., where the boilers are made. A feature of the boiler for which much is claimed is the purifier designed to collect 90 per cent. of the scale forming salts. Other information for those wishing to purchase boilers is contained in the catalogue.

*Lead-Lined Iron Pipe.*—The Lead-Lined Iron Pipe Co., Wakefield, Mass. Price list No. 16, 1895.

This pamphlet is a catalogue and price list of the various kinds of lead-lined iron pipe and fittings made by the above company. The pipe gives all the advantages of a lead pipe without the high cost or lack of rigidity of the latter, which latter feature is important in open work plumbing, as a lead pipe must of necessity be supported at frequent intervals, while the stiffness of an iron pipe makes this unnecessary. The lead lining prevents corrosion, and a portion of the lining extending into the thread of the joint makes it possible to get a tight coupling without the use of red lead. The pipe is also capable of standing very high pressures. Besides its use as a water pipe it is used for ventilation pipes, waste pipes, pipes for acids, etc.

*Cranes.*—The Whitney Foundry Equipment Co., 1522 Monadnock Block, Chicago, 1896.

This well illustrated catalogue shows a wide variety of electric and steam traveling and jib cranes, steam vessel and derrick cranes, belt power jib cranes, etc. The Whiting Company makes a special overhead crane for car wheel foundries, and one of the illustrations shows these cranes at work in the foundries of the Union Car Company at Buffalo. The belt power jib cranes, the column jib cranes, and the hand power jib cranes show a variety of types for various work. There are also illustrations of hand power traveling cranes, triple bridge travelers, compressed air travelers, hydro-pneumatic travelers, hydro-pneumatic and steam hydraulic jib cranes, a variety of compressed air cranes, hoists, etc.

## Massachusetts Railroad Commissioners' Report.

The 27th annual report of the Massachusetts Railroad Commissioners was noted in the *Railroad Gazette* of Jan. 24. Part II., which deals with street railroads was, however, not given out at that time, and has appeared since. Eleven new street railroads were chartered during the year to Dec. 31, six of which are now in operation. The statistics are for the year ending Sept. 30 instead of to June 30, as was the case with the statistics of standard railroads. The principal totals of the street railroad statistics are as follows:

| | 1895. | 1894. |
|---|---|---|
| Miles of line | 910 | .... |
| Miles of main track | 1,078 | 929 |
| Passengers carried, *thousands* | 259,794 | 220,464 |
| Average number of passengers per round trip | 50 | 47 |
| Capital stock | $27,906,685 | $26,971,275 |
| Funded debt and mortgages | 22,915,300 | 19,188,000 |
| Unfunded debt | 1,100,188 | .... |
| Cost of road and equipment | 52,529,948 | 49 815,693 |
| Gross earnings, rentals, etc | 13,246,371 | 11,236,428 |
| Operating expenses | 9,088,086 | 7,729,059 |
| Net earnings | 4,158,286 | 3,507,369 |
| Taxes | 488,138 | 418 999 |
| Interest, etc | 1,313,891 | 1,149,587 |
| Rentals | 98,902 | 126,115 |
| Dividends | 1,606,196 | 1,610,886 |
| Surplus | 651,160 | 201,782 |
| Per cent. of expenses | 68.93 | 69 51 |
| Number of cars | 4,426 | 4,058 |
| Number of other vehicles | 1,755 | 1,790 |
| Number of horses | 1,436 | 2,014 |
| Persons killed | 25 | 29 |
| Persons injured | 1,482 | 1,312 |

On only 84 miles are horses now used, and on only 62 miles are they used exclusively. The number of electric motors reported in 1895 is 4,704, and for the year previous 3,906. The number of passenger cars without motors cannot be estimated, as, evidently, some of the "other vehicles" have motors.

The report says: "The growth of business was almost phenomenal. There were carried the previous year, in round numbers, 220,500,000 passengers; last year, 260,000,000—a larger increase than in any two preceding years combined. Of the 39,000,000 additional passengers carried, nearly 29,000,000 were carried by the eight largest companies. Over 18,200,000 additional passengers were carried on the lines of the West End Railway alone. This company carried 155,231,506 passengers—nearly 60 per cent. of the whole number carried on all the street railways of the State."

An interesting chapter in Part I of the report, which we omitted to mention in our account published Jan. 24, is that concerning the New England Railroad Company, a brief history of which is given from 1863 to the present time. The success of the New York, New Haven & Hartford in getting control of this and other lines in Massachusetts is believed by the Commissioners to be of great advantage to the public. By joint utilization of the terminals and other facilities, the "capacity of each system will be greatly increased. . . . A large opportunity is now offered for more economical administration and more useful public service. The Commissioners have the confidence to believe that the opportunity will be improved."

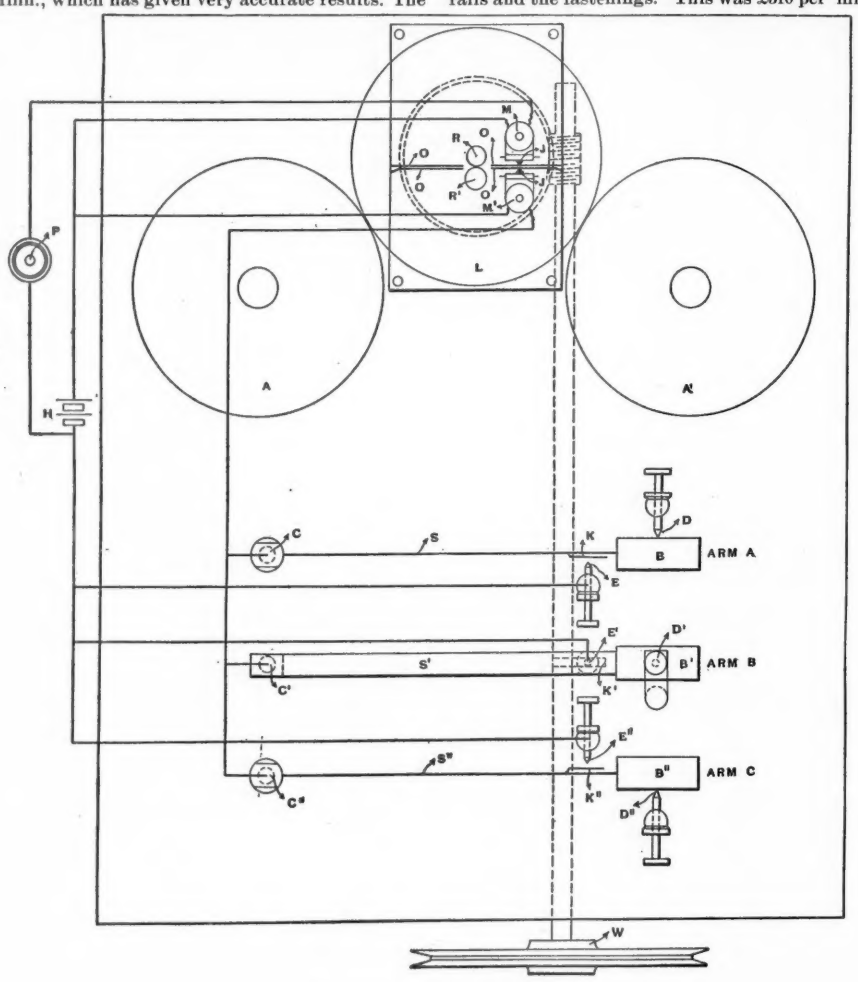
The cost of abolishing grade crossings in Massachusetts, since June 30, 1890, under the special law by which the state pays one-fourth the cost, has been $4,403,853, the

state's share being $1,110,963. The net amount thus far paid out by the commonwealth is, however, only $823,992. (The state also pays the shares apportioned to the towns and gets its money back by installments.) The yearly limit of $500,000 has never yet been reached, and the Commissioners therefore have not been called upon to decide between rival claimants for the state's money; but with the larger undertakings now contemplated, such as that at Newton, the question is likely to come up, and the Commissioners point out that it will be impossible for them to estimate with exactness, months in advance, the probable demands. In cases of doubt the Board will give the benefit of the doubt to the prosecution rather than to suspension of this important work. As the annual allowance has never yet been taken up the state ought to permit temporary over-drafts.

The statistics of accidents are summarized in a manner different from that followed by most State Commissions, and we shall not give them until the full report, with tables, shall have been issued. But it appears from the summary now given that no passengers were killed from causes beyond their own control, and only five were injured, in Massachusetts during the year. The estimated passenger mileage in the State during the year was 1,309,000,000.

### The Stickney Track Indicator.

There has been in use on the Chicago, Great Western Railway for the last four months a track indicator invented and patented by Mr. Charles A. Stickney, of St. Paul, Minn., which has given very accurate results. The




The Stickney Track Indicator.

idea of this indicator is to determine the location of any place in the track which causes the floor of the car, on which the indicator is placed, to make a sudden movement from a straight line.

The engraving shows the electrical connections of this indicator, and the method of recording such defects in the track as the instrument may detect. To detect the sudden movement of the car, showing a defect in the track, three spring arms, or circuit closers, are used; arm *A*, arm *B* and arm *C*. Arms *A* and *C* are used to detect any side swing and arm *B* any vertical motion.

In arm *A*, the stud *C* is fixed to the frame from which the spring *S* extends lengthwise of the car, terminating in the weight *B*. This weight *B* is adjusted against the stop *D*. The stop *E* is placed in such a position that if the weight *B* is withdrawn from the stop *D* a short distance, the spring *K* will touch the stop *E*, thereby closing the circuit of the magnet *M'*.

Arms *A* and *C* have the same parts, but in the arm *C* the positions of the stops are exactly reversed. In arm *B* the stop *D'* is placed above the weight and the stop *E'* below the spring *K*,' which, in this case, vibrates vertically instead of horizontally.

If the car makes a lurch in one direction the spring *K* is thrown against the stop *E*, thereby closing the circuit of the magnet *M'*. A lurch in the opposite direction will cause arm *B"* to close the circuit, and any sudden vertical motion will throw the spring *K'* in contact with stop *E'* and close the circuit of magnet *M'*. It will thus be seen that any abnormal movement of the car in any direction will operate the magnet *M'*.

The recording device consists of the wheel *W*, driven by a belt from the axle, which moves the rollers *R R'* and the disk *L*. The disk *L* turns the spool *A A'* in such a way that a strip of paper rolled under the spool *A*, led through guides *O O O O*, rollers *R R'* and around the spool *A'*, will be fed by rollers *R R'* and be always upon either spool *A* or *A'*. The magnet *M*, which is arranged by the point *J* to puncture the strip of paper, is operated by the push button *P* and is used to indicate the locations of stations, mile posts, etc. The magnet *M'* (by means of point *J'*) indicates upon the paper the locations of imperfections in reference to the marks made by means of point *J*. By reference to a profile of the road, each place can be definitely located and a report sent to the Roadmaster and Section Foreman.

### How Railroads are Built in West Australia.

Our fellow subjects in West Australia are both enterprising and ingenious, and many people will read with interest the account of how they apply these qualities to railway construction. Some little time ago tenders were invited for the construction of a railway from Mullewa to Cue, to open up the Murchison and Yalgoo goldfields. The railway was to be about 196 miles in length, and in the middle of December the various offers were taken into consideration, and the contract was awarded to Messrs Baxter and Prince at £84,535—about £431 per mile. This is not the first experiment in West Australia at constructing railways at almost incredibly low prices. Some months ago Messrs. Wilkie Bros. undertook to construct a railway from Southern Cross, the then terminus, to Coolgardie—a distance of 115 miles—and the contract worked out at £560 per mile, including station buildings, goods sheds, and indeed everything except rails and the fastenings. This was £310 per mile under the lowest price on record, and now the Cue contract has been placed at £129 per mile less.

How can contractors build railways fit to travel upon at such a price? It is managed in this way. The railway toward Coolgardie was opened on the 6th inst. to Woolgangie, roughly speaking 80 miles beyond Southern Cross, and 40 miles from Coolgardie. The contractors will hand over the first half of the line at the end of this month, but they will operate the remaining 60 miles on their own account until next September. This is the whole explanation. It is expected that trains will be run to the outskirts of Coolgardie by the end of next week, and if so, the contractors will have nine months' traffic receipts to set off against the absolute loss they sustain on the construction of the line. A correspondent writing from Perth, the capital of West Australia, states that it would have caused no surprise had the lowest tender for the Cue contract been £200,000. The actual tender at £84,535 is obviously based on very large receipts from traffic during construction. At the present time the business on the Cue road is much smaller than on the Coolgardie, but every month it is increasing.—*Transport.*

This item is interesting; but it would be a good deal more interesting if we had more facts. For example, what kind of railroad is built? What is the traffic, in kind and volume? What rates can be collected? Finally, we should like to know the outcome.

### A Great Suspension Bridge in a Wind Storm.

Mr. C. C. Martin, Chief Engineer and Superintendent of the New York and Brooklyn Bridge, was asked by a reporter for the New York *Times* what effect the hurricane of Thursday had on the structure. He said that it had absolutely no effect, and added:

"During the storm yesterday I crossed the bridge several times to make observations of the effect of the gale on the structure. Once was about 10 o'clock in the morning, when, as Mr. Dunn reports, the wind was blowing at the rate of 72 miles an hour.

"I went over once during the construction of the bridge, when but a portion of the floor system was in place, and practically no wind-bracing was in. Close observation showed a swaying of the structure in the middle of the span of about four inches, and at that time the wind was blowing at 55 miles per hour.

"Yesterday it was not possible to notice a tremor in the bridge itself, and the only effect noticeable on the cars was that they were constantly pressed against the rail on the side from the wind. It was interesting to notice the difference in the force of the wind as felt on the cars on the two tracks. As the wind was blowing down the river, the wind had only to pass through one truss of the bridge before it struck the cars on their way to New York; but on their way to Brooklyn it passed through three trusses, and it was surprising to notice how the posts, cords, and diagonals, etc., of the trusses broke the force of the wind, even at 72 miles an hour, not only directly but by the confusing eddies formed.

"The trains as they rounded the curve as they approached the Brooklyn station, running by gravity, were very very perceptibly retarded by the wind.

"Notwithstanding the wind and the rain the trains ran with their accustomed regularity, and not a trip was missed. The travel in the morning was very heavy and nobody walked across the bridge."

A bridge policeman who was on duty on the bridge during the height of the storm told the reporter that there was a perceptible swaying of the structure.

"The wind was blowing apparently with force enough to overturn trucks and made it dangerous for a man to move along in the exposed places without holding on to the railing, but there was no swaying on the structure itself that I could feel. The wind did not appear to affect the bridge at all."

### Abandonment of the "Chain Gang" on the P., C., C. & St. L.*

It is now a considerable number of years since our engines had single crews, and in that time the conditions of the service have changed so that no comparison of cost between the service at that time and now would be of any value. During these years (until two years ago) our engines were run in the system of extra crews [a division has say 35 engines in freight service, and for these has 50 crews. The engines are assigned to 35 of these crews, and the other 15 crews are extra. The regular men make all their mileage on the engine assigned to them], and our proportion was from one-fourth to one-third more crews than engines. It is to this system that we have now returned after two years' trial of the "first in first out" or chain-gang system.

The cause which led our company to take this backward step was the additional expense of the system without a corresponding advantage. The same number of engines and crews were employed as before and there was no increase in the mileage. The engines not being assigned to any one crew, none of the men took any special interest or care of them. Nor was this expected of them. It was therefore necessary to employ additional men in the roundhouses to do the work that was formerly expected of the crews. This additional help increased our roundhouse expense per engine handled, a little over 11 per cent., or $5,000 a year. This included light repairs which are done in the roundhouse to engines in service or that may be laid up for a few days. We also found that, by comparing the two years of service in the "first in first out" system with the two years next preceding its introduction, 20 per cent. less mileage between shoppings had been obtained in passenger service and 24 per cent. less in freight service. With this reduction of mileage between shoppings for general repairs we had a corresponding increase in the cost of repairs. In theory, we say two engines of the same build, in the same service, the repairs made and looked after with the same care, should give the same service, leaving accidents out of the question; yet we found that such results had not been obtained, and the only reason we can give is that the personal interest which the crews take in engines that are assigned to them in the extra crew system, is left out in the other; it is true that to make up for the work done by the crew, we had added to the roundhouse expenses, but this did not supply the loss created by taking the responsibility for the condition of the engine away from the crew and placing it on the men employed in the roundhouse. Efforts were made to have the enginemen report work needed on engine at each end of the road each trip, and discipline applied for not reporting, but with all, the reports were not carefully made, because of the lack of interest in the engine on which they had just made a trip and because the same crew may not have the same engine again for several trips, and thus the duty of reporting work is left to the next crew or to the engine inspector to find out.

Personal interest in the performance of any duty is of the utmost importance, and no work is well done that ignores this principle. It applies not only to engine crews, but to all branches of railroad service; to the officers as well as to the other grades of employees, and no discipline will take its place. . . . But economy is not the only advantage. The principle which stimulates men to take a personal interest in the tools they work with, or the duty they are called on to perform, makes better men of them. The engineer and fireman who care only for the trip and not for the engine; who only oils round starts and stops, or to keep up steam, and who feels that his responsibility ends with the trip, will make but little progress toward improvement; but with the responsibility for the condition of the machine comes a personal interest in it, which must result in advancing their knowledge of the engine, and thus making them more valuable men.

* From a paper by Mr. William Swanston, Master Mechanic of the Pennsylvania Lines, recently read before the Central Association of Railroad Officers at Indianapolis.

### American Portland Cement Tests.

A series of tests of American Portland cement made by Mr. Robert W. Lesley, Assoc. Am. Soc. C. E., and presented by him in a recent paper before the Boston Society of Civil Engineers, is given herewith. They derive their particular value from the fact that they extend over periods varying in length up to five years, and are seconded by the performance of the cement in actual service on the various engineering works covered by the tests. Mr. Lesley gave in his paper an interesting account of the progress of the Portland cement industry, both in this country and abroad. Concerning testing, Mr. Lesley says: In the first place, let us consider what are the means of determining what a good Portland cement is, and what are the requirements generally adopted for the determination of such qualities. The first method is the testing for fineness and tensile strength. This testing may be for short or long periods, but the most convincing proof to the engineer, and far more conclusive than any of the the ordinary 7 and 28 day tests that are usually used, is afforded by a table which will be found below, showing records on 300,000 barrels of American Portland cement, used on five of the most important pieces of work done in the United States, and carried out to a period of five years, showing continuous gains in the neat and sand tests made in the laboratory, and continuous gains in all the sand tests taken from the mortar boxes actually in use during the construction of the work. This table contains what are believed to be the only long-time records of Portland cement in the world for similar quantities and for as many different pieces of work.

The second method of testing cement is by chemical analysis, to determine the constituents of the material, and whether it is properly proportioned or has an excess of the deleterious elements of sulphate of lime and magnesia. Analyses of American Portland cements made by such men as De Smet, of Washington; Faija, of London; Booth, Garret & Blair, of Philadelphia, show that the American Portland cements made in the standard way, compare favorably in all their elements with the analyses of the best foreign brands, as made by the best foreign analysts.

LONG-TIME TESTS OF AMERICAN PORTLAND CEMENT (GIANT BRAND).

| Location of cement tested. | Mode of Mixing. | 1 Day. | | 1 Week. | | 1 Mo. | | 3 Mos. | | 6 Mos. | | 9 Mos. | | 1 Year. | | 15 Mos. | | 18 Mos. | | 2 Years. | | 3 Years. | | 4 Years. | | 5 Years. | | Fineness. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Number of Briquettes. | Average, in pounds. | Residue on No. 50 sieve, 2,500 holes to square inch. | Residue on No. 74 sieve, 5,180 holes to square inch. | Residue on No 100 sieve, 10,000 holes to sq. in. |
| Sodom and Bog Brook dams, New York Aqueduct. About 50,000 barrels. | Neat | 1,025 | 140 | 1,398 | 348 | 220 | 422 | 180 | 540 | 100 | 634 | 30 | 638 | 180 | 682 | 30 | 687 | 110 | 672 | 110 | 694 | 90 | 736 | 60 | 771 | 10 | 840 | ..... | ..... | 18.0 |
| | 2 to 1 | .... | .... | 220 | 166 | 126 | 280 | 140 | 364 | 84 | 468 | 50 | 468 | 90 | 493 | 36 | 526 | 100 | 530 | 100 | 564 | 120 | 680 | 120 | 664 | 20 | 709 | | | |
| | 3 to 1 | .... | .... | 226 | 140 | 140 | 231 | 112 | 350 | 110 | 428 | 30 | 428 | 240 | 420 | 40 | 500 | 80 | 514 | 80 | 512 | 160 | 572 | .... | .. | 10 | 590 | | | |
| Titicus dam, New York Aqueduct. About 100,000 barrels. | Neat | 3,448 | 157 | 4,165 | 380 | 637 | 476 | 505 | 529 | 478 | 575 | 479 | 599 | 350 | 642 | 181 | 594 | 135 | 584 | 137 | 641 | 62 | 668 | .... | .... | .... | .. | ..... | ..... | 11.7 |
| | 2 to 1 | ..... | ... | 2,934 | 200 | 424 | 317 | 281 | 450 | 321 | 491 | 278 | 532 | 219 | 549 | 157 | 557 | 92 | 541 | 52 | 536 | 37 | 573 | | | | | | | |
| | 3 to 1 | ..... | .... | 1,604 | 115 | 267 | 185 | 450 | 289 | 133 | 347 | 146 | 311 | 132 | 426 | 70 | 424 | 66 | 416 | 126 | 419 | 7 | 483 | | | | | | | |
| Carmel and Craft's dams, New York Aqueduct. About 40 000 barrels. | Neat | 1,786 | 140 | 1,075 | 343 | 324 | 443 | 551 | 517 | 529 | 548 | 491 | 568 | 289 | 617 | .... | .... | 273 | 604 | 211 | 611 | .... | .... | .... | .. | .... | .... | ..... | ..... | 14.7 |
| | 2 to 1 | ... | .... | 1,642 | 182 | 216 | 308 | 85 | 445 | 87 | 480 | 76 | 472 | 43 | 585 | .... | .. .. | 49 | 477 | 55 | 475 | | | | | | | | | |
| | 2 to 1 from mortar box | ..... | .... | 61 | 164 | 51 | 237 | 8 | 385 | 11 | 494 | 8 | 491 | 7 | 367 | ... | .... | 12 | 516 | 3 | 568 | | | | | | | | | |
| | 3 to 1 | ..... | .... | 13 | 100 | 13 | 174 | 7 | 319 | 12 | 372 | 11 | 398 | 10 | 413 | .... | .. | 8 | 401 | 10 | 406 | | | | | | | | | |
| | 3 to 1 from mortar box | ..... | .. | 45 | 112 | 31 | 166 | 6 | 310 | 8 | 480 | 7 | 500 | 9 | 541 | .... | ... | 7 | 437 | 5 | 406 | | | | | | | | | |
| Reading Terminal Railroad and Station, Philadelphia. About 60,000 barrels. | Neat | ..... | .... | 329 | 315 | 267 | 376 | 69 | 451 | 15 | 549 | 16 | 576 | 10 | 523 | 1 | 640 | .... | .... | .. | ... | . | .... | .... | .. | .... | ... | .090 | 10.04 | 14.79 |
| | 3 to 1 | ..... | .... | 536 | 79 | 431 | 129 | 104 | 174 | 20 | 228 | 15 | 225 | 47 | 261 | 5 | 287 | | | | | | | | | | | | | |
| | 2 to 1 from mortar box | ..... | ... | 190 | 84 | 180 | 144 | 17 | 219 | 13 | 234 | 25 | 281 | 62 | 325 | 12 | 417 | | | | | | | | | | | | | |
| Niagara Falls Tunnel, Niagara Power Company. 60,000 barrels. | Neat | ..... | .... | 495 | 321 | 3 9 | 420 | 12 | 514 | 24 | 562 | .. | .... | 24 | 661 | .... | .... | .... | .... | .. | | .... | .... | .... | .... | .. | .. | ..... | ..... .. | 14.9 |
| | 2 to 1 | ..... | . | 489 | 152 | 271 | 242 | 54 | 369 | 20 | 454 | .... | .... | 7 | 472 | | | | | | | | | | | | | | | |
| | 3 to 1 | ..... | | 527 | 98 | 399 | 177 | 143 | 254 | 181 | 301 | .... | ... | 12 | 391 | | | | | | | | | | | | | | | |

## TECHNICAL.

### Manufacturing and Business.

The sale of the rolling stock of the Chicago, Indiana & Eastern, which was announced recently, has been declared off.

Messrs. Colby & Foley, who purchased the Dauphin, Pa., Car Works, have formed a stock company with a capital of $50,000 and will enlarge the present plant. New buildings will be added and about 200 men employed. The title of the new company will be the Dauphin Bridge Co. About $30,000 will be spent on new machinery.

The Chicago Pneumatic Tool Co. reports that early this month it received a second order from England for 10 pneumatic hammers of the size used for beading flues and calking boilers. During the past three months this company has forwarded to Europe about 63 of its hammers, a large portion of these going to England. The order for 10 hammers noted above came from London. The company is bringing out some new tools, and is making a new size of hammer for riveting staybolts.

The Ramapo Wheel & Foundry Co. is putting up a new machine shop, 60 ft. × 100 ft., and a new blacksmith shop, 60 ft. × 160 ft. The new buildings will be modern in every way. Power will be obtained from a central plant equipped with Westinghouse engines and generators. The planers and blowers throughout the shops will have individual motors, but the lighter machinery will be operated in series, with separate motors for each series.

The Huntingdon & Broad Top Mountain road, in Pennsylvania, has just completed financial arrangements which will enable it to put air-brakes and automatic couplers on its entire equipment.

The stockholders of the Indiana Car & Foundry Co. held their annual meeting at Indianapolis last week. The old directors and officers were re-elected: Major Collins, President; Emil Pollak, Secretary, and J. K. Pollock Treasurer. The business of the company for the past year was reported as satisfactory.

Wendell & MacDuffie, Havemeyer Building, New York City, have been appointed sales agents for the Warren Electric Co., of Chicago.

J. S. Bundy, of Newark, N. J., builder of hoisting engines, has an order from the New York Central for the engine to operate the 290-ft. drawbridge span over Spuyten Duyvil Creek at New York. The engine will have double cylinders with a reverse link motion and operate two lines of steel shafts, 4¾ in. in diameter, by gearing for opening and closing the draw. The engine is specially arranged for operating the temporary lift draw now in use across the Spuyten Duyvil Creek, and as soon as the permanent drawbridge is erected it will be transferred to the new draw.

The Union Car Co., of St. Louis, has been organized by Henry W. Rocklage, Ernest Obertbeck, Herman Holman and others.

### Iron and Steel.

The puddlers employed at the 23 furnaces of the Wheeling Steel & Iron Company's Works at Benwood have resumed operations after an idleness of four months.

The Berlin Iron Bridge Company, of East Berlin, Conn., has taken the contract to construct an ocean pier at Old Orchard Beach, Me., and will begin work immediately.

The American Pig Iron Storage Warrant Co. had 107,600 tons of pig iron in yard Jan. 31, 100 tons having been withdrawn and 1,100 tons put in in the preceding 10 days.

The stripping carried on by the Mahoning Ore Co., of the Mesabi Range, since the close of its 1895 shipments, has laid bare 400,000 tons of ore.

The Tonawanda Iron & Steel Co., of North Tonawanda, N. Y., has its new stack almost completed, and expects to put it in blast about March 1.

The Pioneer Rail Renewing Company, which leased the North Chicago rolling mill of the Illinois Steel Company, will probably build a plant of its own at Joliet, as the lease on the present plant has expired.

At the annual meeting of the Cleveland Rolling Mill Company the following officers were elected for the ensuing year: William Chisholm, President; W. B. Chisholm, Vice-President; E S. Page, Secretary.

The Vulcan Iron Works, Toledo, O., at its annual meeting elected the following officers for the ensuing year: President, A. L. Backus; Vice-President, M. I. Wilcox, and Secretary, John W. Smith.

The Colorado Fuel & Iron Co., Pueblo, Col., produced in 1895 59,494 net tons of pig iron, 3,386 net tons of spiegel, 3,470 tons of castings, 4,357 net tons of cast pipe, 43,238 net tons of steel rails, 2,674 tons of spikes, 1,629 tons of angles and 15,904 net tons of merchant iron.

At the Cleveland Steel Co.'s plant the extraordinary output of 51 tons of steel in 10 hours was made on Jan. 28.

The Joliet Mills of the Illinois Steel Company resumed operations on Monday, Feb. 10, after a shutdown of two months. The wage question has been settled with the men and 2,500 will be given employment.

A reorganization scheme has been adopted by the Georgia Mining & Mfg. Co., and one of the first results is the blowing in of the blast furnace belonging to the company at Chattanooga, Tenn. Everything has been overhauled, and about 150 men will be given employment.

The Sloss Iron & Steel Co. blew in their furnaces at Birmingham, Ala., last week, after being closed for about two years. Their capacity, which was originally 200 tons daily, has been doubled.

The Greensboro Furnace Co. organized last week by the election of the following officers: President, Dr. J. M. Worth; Secretary and Treasurer, H. M. Worth; Directors, D. F. Caldwell, J. M. Worth, H. M. Worth, E. P. Wharton, R. N. Douglass, D. G. Worth. This is the plant established at Greensboro, N. C., by the North Carolina Construction Co. about two years ago. It has never been in operation owing to financial troubles of the construction company.

### New Stations and Shops.

The Berlin Iron Bridge Co. has just completed for the Silver Springs Dyeing and Bleaching Co., of Providence, R. I., three buildings made with steel frames and corrugated steel coverings, an engine house, a box shop and a boiler room. The Berlin Co. has also lately completed a fire-proof boiler room for the Passaic Print Works at Passaic, N. J.

The Galveston (Tex.) City Council has passed the ordinance authorizing the Gulf, Colorado & Santa Fe to close one of the city streets in order to reach the site purchased by that company for a new station. This would appear to end the doubt as to whether Galveston would secure the proposed Union station. It is said that the new station and the improvements in connection with it will cost about $100,000. The Gulf, Colorado & Santa Fe has taken the leading part in the plan for the erection of the station.

Mr. Bradford L. Gilbert is making plans for the addition of two stories to the office portion of the Grand Central Station, New York City, and it is said that the work will be done this spring, though the officers of the road will not confirm this statement. This alteration is rendered necessary by the demand for accommodations for the large clerical force of the New York Central. Several hundred of these employees are now scattered in three or four different buildings in the vicinity of the Grand Central Station. The addition will probably cost in the neighborhood of $250,000. It is not proposed to make any alterations in the waiting rooms or the train sheds of the station this year. With the addition of the two new stories will come the introduction of passenger elevators. There was some talk a year ago that the New York Central would erect a large office building on the south side of Forty-second street, but that project, it is said, has been abandoned.

### Structural Iron Workers Organize.

The workmen employed in bridge and structural iron work organized at Pittsburgh on Feb. 6 under the name of the National Association of Bridge and Structural Iron Workers of America. The following were elected officers: President, Edward J. Ryan, Boston; First Vice-President, John Brady, New York; Second Vice-President, August Hanna, Cleveland, O.; Secretary and Treasurer, J. W. Crowley, Chicago, and National Organizer, George W. Geary, Chicago. Executive Board—David McKelvey, Pittsburgh; James Kelly, New York; P. J. Dalton, Chicago; John McIntyre, Buffalo; Emil Teters, Cleveland. The next annual meeting will be held in Buffalo. Chicago is the national headquarters.

### Steel Rail Orders.

The condition of the rail market is rather better than that of the other allied products. The standard sections delivered during the past year amounted to 1,100,000 tons. So far this year the aggregate orders foot up, according to the estimate of the *Iron Age*, to between 250,000 and 300,000 tons. With structural shapes also there seems to be promise of large orders during the coming year.

### Electricity on the New York & Brooklyn Bridge.

Several tests of the motor car on the New York & Brooklyn bridge were made last week, all of which were very satisfactory. The car used is one of the ordinary bridge cars, fitted with a 50 H. P. motor on each of the four axles. The motors are of the General Electric type, but no contract for equipping more cars will be made immediately, as the bridge trustees have resolved to give the General Electric and the Westinghouse Co.'s each a month's trial before deciding on the type of motor to be used. The motor cars will be used for switching at

the bridge terminals, and will do away with the present delay of coupling a switch engine at each end, as the motor cars will not be detached from the trains. The motor cars are not intended to be used in place of the cable, although they may be used in case of accident to it, or in the early morning when it has been stopped for inspection.

**Another Motocycle Race.**

The *Cosmopolitan Magazine* announces in its February issue that $3,000 is to be offered in premiums which will be awarded to motor carriages exhibiting the greatest number of points of excellence in the trial trip to be made on Decoration Day, May 30, over a course extending from City Hall Park to the Cosmopolitan Building at Irvington on-Hudson. The round trip is about 52 miles. The following points will be considered in making the award: Speed, 50 points; simplicity and durability of construction, 25; ease in operating and safety, 15; cost, 10. Entries must be made before May 1. The route extends along Broadway to Central Park, through the latter to the Washington Bridge, thence to Yonkers, where the course will include five miles of asphalt pavement, then along the Hudson to Irvington and return, making a very good stretch of road for such a trial.

**Gas Motor Cars in Paris.**

The Paris Gas Company is putting a Luhrig gas tram car on the Paris Omnibus Company's tramway lines by way of experiment.

**A New Freight Steamer.**

The Neafie & Levy Ship Building Company are building a large freighter for the Menendez Company of Havana, which is to trade between the United States and Cuban ports. She will be of steel, 250 ft. 8 in. long, 35 ft. beam and 20 ft. deep. She will be provided with twin screws and triple expansion engines. The vessel will be lighted by electricity and will be named "Reina de los Angeles.

**A New Pipe-Line Contract.**

The East Jersey Water Company has awarded the contract for laying its new conduit from Macopin Lake to Belleville, N. J., to Gillespie Bros., of Pittsburgh, who built the first line. Work has been begun.

**Armor Plate Makers Protest.**

Andrew Carnegie, Millard Hunsicker and Lieutenant C. A. Stone, representing the Carnegie Works, and John Fritz, Joseph Wharton, R. W. Davenport and George H. Myers, representing the Bethlehem Works, were before the Senate Committee on Naval Affairs on Feb. 8, to protest against the enactment of Senator Smith's bill providing for the erection of a Government armor-plate plant in Washington. Mr. Carnegie and Mr. Wharton asserted that to equip such a plant would cost more than $4,000,000. They argued that in view of the fact that immense sums had been invested by private persons in this business at the suggestion of the Government, it would be unjust for the Government to render that outlay useless by the construction of competing works that could do the work no better and no cheaper.

**Hall Signals on the Atlantic City Railroad.**

The contract for equipping this road with Hall signals was noticed in the *Railroad Gazette* of Jan. 31. Vice-President Voorhees has given us the following particulars:

"The signals will stand normally at danger (stop). They will be put in so as to control the line from Gloucester Junction, Camden, to the drawbridge at Atlantic City, 54 miles of double track. On the southbound track there are 18 blocks, and on the northbound 17, the shortest block being 2,244 ft. and the longest 6.2 miles. There are 26 separate home signals, 9 home signal heads and 5 distant signals, a total of 40 signals, with continuous track circuit. There are in the main track, between the points named, 101 switches, all protected, the switch protection being of such character that either the siding switch or the derailing switch on a siding (all of our sidings are provided with derailing switches), being set to admit cars from the siding to the main track, will cause the block signal to indicate 'stop,' and in crossovers, either switch being open, will cause the block signals on both tracks to indicate 'stop.'

"There are five (5) interlocking plants in the 54 miles, and the automatic protection is to continue through them, as to track and switches; the block signals, however, to be separate from the interlocking in their action. There will be a block signal head on each interlocking signal post, which will indicate the condition of the track and switches, as well as the condition of the block, the interlocking signals being used to govern movements to and from side tracks.

"The drawbridge at Atlantic City is to be connected so that unlocking the draw, and before any movement of the bridge can be made, will cause the block signals on both sides to indicate 'stop.'

"Work was begun Jan. 10, and it is expected to complete it by March 31."

**Recent Boiler Plate Tests.**

Some interesting results have been obtained by the Paxton Rolling Mills, of Harrisburg, Pa., on tests of boiler plates for 20 Russian locomotives now building at the Baldwin Locomotive Works. The steel was required to show a tensile strength of 35 to 42 kilos. per square millimeter (about 50,000 to 60,000 lbs. per square inch), and an elongation in 8 in. of 25 per cent., both longitudinal and transverse. With the exception of 20 plates ⅝ by 87 in. wide, the material varied from ¼ to ¾ in. thick by 74 in. wide and under. Of the 104 plates rolled, three failed in tensile and one on gage. In elongation the remaining 100 plates averaged 27.46 per cent in the longitudinal direction and 27.90 per cent. in the transverse—the latter result not generally looked for. All the steel slabs were furnished by the Pennsylvania Steel Co., made in open hearth basic furnaces, and showed an average analysis as follows: Carbon, 0.165; phosphorus, 0.014; manganese, 0.37, and sulphur, 0.27.—*Exchange.*

## THE SCRAP HEAP.

**Notes.**

The New York State Railroad Commissioners announce that hereafter when a new company asks leave to build a railroad, the members of the Board will make a personal inspection of the proposed route before taking final action.

The Superintendent of the Pittsburgh Division of the Pennsylvania has issued an order putting the trainmen in charge of the heating apparatus on sleeping cars. The regulation of the temperature in these cars has heretofore been intrusted to the Pullman porters.

Western papers report that the Atchison, Topeka & Santa Fe is reducing salaries at some places, and expenses are being reduced all along the company's lines. The reduction of forces in the shops was noted in the *Railroad Gazette* last week. The number of men discharged at Topeka was 300. It is said that on March 1 the commercial agencies at Philadelphia, Buffalo, Cleveland, Quincy, Minneapolis and Omaha will be closed.

The Massachusetts Railroad Commissioners have dismissed the petition against the West End Street Railway Company of Boston, which asserted that the road was using fenders on its cars which in no way complied with the order of the Commissioners, issued under an act of the Legislature of 1895. Chairman Sanford, in summing up the case, stated that it was evident to the Board that the petition was brought in the interest of inventors of fenders and not in the interest of the general public.

R. F. Smith, Superintendent of the Pennsylvania Voluntary Relief Department on the lines west of Pittsburgh, has prepared a statement showing the percentage of employees who are members of the association. It shows 55 per cent of the officers, agents and clerks, 61 per cent. of the telegraph operators, 91 per cent. of the conductors, 79 per cent. of the brakemen, 86 per cent. of the engineers, 76 per cent. of the firemen, 72 per cent. of the yard men, 72 per cent. of the shop men and 32 per cent. of the section men.

Trains on the New York Central were delayed about forty minutes on Feb. 9 by a fire in the tower of the drawbridge at 135th street and Fourth avenue, New York City. The draw at this point, which is in the temporary line used while the new four-track draw is being built, is lifted by a small engine operating a winding drum which is located in a tower immediately above the tracks. The fire started in the engine-room, probably in a pile of cotton waste. The house inclosing the engine is mostly of corrugated iron; the wooden portion of it was destroyed.

Senator Cullom has introduced in Congress a bill prohibiting the interstate transportation of certain wild game and fowls except in accordance with the laws of the state from which the shipment is made. Many states have laws limiting such transportation to certain months of the year. Senator Pettigrew, of South Dakota, has introduced a bill to place sleeping cars under the control of the Interstate Commerce Commission. Mr. Broderick, of Kansas, has introduced a bill providing severe penalties for shooting at trains or otherwise interfering with them, in the Indian Territory. In the New York Legislature an employer's liability bill has been introduced; it aims to give employees the same rights as outsiders. Senator Coggeshall has introduced a bill intended to compel the use of better lights on the cars of elevated railroads in large cities. In the New Jersey Legislature there is a bill requiring railroads to fence their lands or be liable to three times the amount of any damages which may result from lack of a fence. In the South Carolina Legislature last week a bill was introduced to require separate cars for colored passengers, although a bill of this character has been defeated every year for a long time. Another bill, which has been passed by one House, makes first-class passenger fares three cents a mile throughout the state.

**A Bridge Failure in Bridgetown.**

During the erection of the new bridge across the Cohansey, at Broad street, Bridgeton, N. J., a temporary pontoon bridge for pedestrians has been in place. Across this Miss —— ——, who tips the scales at the 200-mark, started to walk. As she reached the center the structure careened and dropped her into the water.

**Another Ideal Gone to Smash.**

The Pennsylvania, both east and west of Pittsburgh, has adopted the practice of covering the handrails, cylinder-head casings, steam-chest bonnets and other bright parts of locomotives with paint, instead of giving them a bright finish as has been the custom from time immemorial. According to a local paper this innovation is very distasteful to many of the old enginemen, who have taken pride in keeping the brass and copper work of their engines polished for use as looking glasses. Whether or not it displeases the firemen, who have had to furnish the elbow grease to maintain the engines in splendor, is not stated. The enginemen, it is said, are also much displeased because they have had to take off the deer horns, stars and other unofficial ornaments that have served to give many engines some real individuality.

**Santa Fe Hospital.**

The new hospital for employees of the Atchison, Topeka & Santa Fe Railroad at Topeka is now open. It is a large and handsome building four or five stories high, the main walls being of Colorado stone and pressed brick. It cost about $125,000. The Santa Fe Hospital Association, supported by assessments upon the employees and managing the hospital, was chartered in 1891. This association also controls hospitals at La Junta and Las Vegas.

**A Typical "New Railroad."**

The brief and melancholy history of a railroad project whose merits were exploited through many columns of the local newspapers between Pittsburgh and Harrisburgh a few months ago, is laconically expressed in the following extract from a recent letter sent to us in answer to a series of questions as to the amount of road surveyed, under contract, or graded: "Since preliminary survey was made over a year ago, nothing whatever has been done. I had to levy on their movable property for my salary. It was simply a deal made by New York and Pittsburgh brokers, who bought the property by mortgage, thinking that by running a line they could sell out. They got left." As a matter of fact, it is very much harder to run a line and sell out now than it was 10 years ago. The Hon. George Appo, Bunco Engineer, etc., said that "a sucker is born every minute," but fortunately the sucker cannot command much money now.

**South American Notes.**

Mr. Thomas Gregory has been appointed Traffic Manager of the Buenos Ayres Great Southern Railway, in the place of Mr. Henry Loveday, who has recently become General Manager of the Central Argentine Railway.

According to the new law relating to the guaranteed railroads in Argentina, the government is to issue bonds to the several roads, bearing 4½ per cent., aggregating $33,604,634, which will requrie an annual service of $1,512,209 gold.

The trade movement of Argentina for the first nine months of 1895 was as follows: Imports, $68,200,000; exports, $93,200,000, on a gold basis. The improvement in trade is further shown by the circumstance that during the same period the gold bullion imports were $3,600,000, against exports of $90,000.

The following table, showing receipts and expenses of the railroad lines in the state of São Paulo, Brazil, for the year ending June 30, 1895, suggests prosperity. Values are stated in *mil reis*, owing to the fluctuations in Brazilian currency. The present exchange rate is 18¼ cents the *mil reis*.

| | Receipts. Milreis. | Expenditures. Milreis. |
|---|---|---|
| São Paulo Railway | $7,969,339 | 6,502,148 |
| Paulista System: | | |
| Main Line | 4,648,116 | 1 830,417 |
| Rio Claro Division | 2,145.813 | 963,024 |
| Santa Rita " | 69.079 | 60,841 |
| Descalvadense Division | 25,122 | 26,905 |
| River service | 76.226 | 120,559 |
| Mogyana Railroad | 2,873,716 | 488,579 |
| Sorocabana " | 2,195.800 | 1,090.820 |
| Ituana " | 642.796 | 436.041 |
| Campineiro " | 113,716 | 95.863 |
| Italibeuse " | 114.027 | 87.405 |
| Bragantina " | 169.427 | 93,282 |
| Total | 21,041,177 | 11,795,884 |

## LOCOMOTIVE BUILDING.

The Brooks Locomotive Works has an order from the Northern Ohio for building six Mogul engines with 18 in. × 24-in. cylinders. These engines are similar to the six building for the Lake Erie & Western, which operates the Northern Ohio road.

## CAR BUILDING.

The Delaware, Lackawanna & Western is receiving bids for building 1,000 cars.

The Chicago & North Western has ordered 100 furniture cars from the Haskell & Barker Car Co., of Michigan City.

The New York Central & Hudson River road will shortly order about 2,200 freight cars. The orders will include coal and box cars and may be given out this week.

The Geiser Co., Waynesboro, Pa., has placed another order for six private freight cars with the Carlisle Mfg. Co. These cars have a capacity of 60,000 lbs. and are 60 ft. long.

The St. Charles Car Co. has just completed a new dining car for the Atlanta & West Point road. The car is handsomely fitted up, red mahogany being used for interior finish.

The Jackson & Sharp Company, of Wilmington, Del., has received a contract for building 13 vestibuled cars for the Central Vermont road, and one for four coaches for the Ulster & Delaware road.

The Erie Railroad has just placed with the Buffalo Car Co. an order for 500 twin hopper gondola cars. A further order for about 1,700 cars has been given out to a company west of Buffalo, but we are not at liberty to give the name of the contracting company this week.

The Lake Shore & Michigan Southern car order was given out this week, the number awarded being 1,500 cars. The contract was distributed among five companies, the Michigan-Peninsular Car Co.; The Wells & French Co; the Union Car Co.; Barney & Smith Manufacturing Co. and the Madison Car Works. The Union Car Co. has 350 cars.

The St. Charles Car Co. has leased to the Receivers of the Galveston, La Porte & Houston three coaches, three mixed coaches, three combination passenger, baggage and express cars, two caboose cars, 50 coal cars and 50 box cars for $66,200, of which $22,066 is paid in cash and the remainder by two notes of $22,066 each, due in one and two years after date, respectively. The cars were in the possession of the railroad, but were reclaimed by the car company shortly before the receivership.

## BRIDGE BUILDING.

*For an account of the bridges destroyed during the flood of Feb. 6, see page 107.*

**Aitkin, Minn.**—The consent of the Secretary of War is now being secured for building a wagon bridge across the Mississippi River at this place.

**Albany, N. Y.**—A bill has been introduced in the Legislature by Mr. Malone, providing for the construction of a bridge over the Mott Haven Canal at 135th street, New York City, and appropriating $30,000 for it.

**Bellefonte, Pa.**—The court has recommended the erection of a bridge across Spring Creek, in College township.

**Bradford, Pa.**—The Mayor has recommended that an iron bridge be built at Foreman street as soon as possible. No action has as yet been taken in the matter.

**Bridgeport, Conn.**—Regarding the proposed bridge over Yellow Mill Pond recently noted in these columns, general plans have been made and the cost is estimated at $57,000. The Board of Public Works will take action in the matter some time before Feb. 20.

**Camden, N. J.**—We spoke last week of the delay in the completion of the approaches of the Pennsylvania Railroad bridge over the Delaware at this point, owing to the disagreement of the jury in the trial to award damages for the Hatch property. The railroad company

has changed its plans so as to avoid the property of Mr. Hatch, and work has been begun upon a Y leading from the New Jersey end of the bridge through the company's own lands to a point on the Camden & Amboy, a short distance above Fish House station. This Y will be about 1,800 ft. long, and all trains over the bridge for Atlantic City and Cape May and points on the South Jersey coast will be run over it. It looks very much as though Mr. Hatch in attempting to get a great deal more than his property is worth, has killed the goose that laid the golden egg. It is probable now that the property, if bought by the railroad company at all, will be bought upon its own terms.

**Chicago, Ill.**—The City Engineer has been instructed to prepare plans for a viaduct which will connect the North Side Lake Shore drive near St. Clair street with Michigan avenue. Not including a bridge over the river the estimated cost of this work is about $200,000.

**Cincinnati, O.**—Bids will be received at the office of the Board of Administration, until Monday, March 2, for building the masonry sub-structure for the bridge over Florence avenue, from Gilbert avenue to Kenton street.

Bids will be received as above until Monday, March 2, for the construction of the steel superstructure of a bridge over Florence avenue, furnishing all necessary labor and materials and paving the roadway and sidewalks with asphalt, in accordance with specifications.

The work herein advertised consists of—
2 plate girder spans of 60 ft. long each.
1 plate girder span 90 ft. long.
1 plate girder span 75 ft. long.
70 lineal ft. of hand railing on masonry approaches.
The total length of the bridge is 285 ft.
Width of roadway in the clear, 32 ft.
Width of sidewalks in the clear, 8 ft.

Bidders must indorse their names on the outside of the envelopes containing their proposals.

Each bid must be accompanied by two disinterested sureties, or a certified check in lieu of sureties.

Bidders will use printed forms, as none other will be received.

**Denver, Col.**—Work has been begun on the new bridge over the Grand River, near Palisades, in Mesa County. The cost of the bridge will be $8,800.

**Galveston, Tex.**—The Missouri Valley Bridge and Iron Works, A. J. Tullock, proprietor, Leavenworth, Kan., has the contract for the drawbridge over Galveston Bay for the Galveston, La Porte & Houston, H. J. Simmons, Chief Engineer. The swing span will be 200 ft. long, trusses 15-ft. 8-in. centers and 27-ft. deep. The drum will be a 24 in 100-lb. beam. The center pier will be a steel shell, 22 ft. diameter, filled with concrete on pile foundation.

**Grand Island, N. Y.**—Regarding the bridge across the Niagara River at this point, Gen. Craighill, Chief of Engineers, has expressed himself as follows: A bridge 60 ft. high would not accommodate all vessels that a 100-ft. bridge would. The masts of tow and steam barges are 90 ft. and more high, requiring 100 ft. clearance. If the bridge is over 60 ft. it should be 100. No intermediate height above 60 ft. would have any value.

**Lewisburg, Pa.**—Leading merchants have started a movement looking toward the erection of a free bridge at the foot of Market street.

**McKeesport, Pa.**—The Pittsburg, McKeesport & Youghiogheny proposes erecting a bridge across the Youghiogheny River at this point.

**Nebraska City, Neb.**—The County Commissioners have asked for bids until March 5 for all the bridges needed by the county during the coming year.

**New York.**—The Commissioners of the New East River Bridge met on Feb. 5. A report from Chief Engineer Buck was received in which he recommended the use of steel towers to support the new structure, because of the rapidity with which they can be built, and of their cheapness as well as the small obstruction they present to a full width roadway. It is also easier to reinforce steel towers than stone ones. The report was indorsed by the Commssioners. The foundations of the towers will be of stone up to about 20 ft. above the water.

The plans for the approach to the New York end of the proposed New York & New Jersey Bridge, which were provisionally accepted by the Sinking Fund Commission on Jan. 17, have been submitted to the Corporation Counsel.

A bill has been introduced in the Legislature by Assemblyman Delmour of the Twenty-third district to fix all of the cost of the 155th street viaduct on the city.

**Niagara Falls, N. Y.**—It is proposed to remove the grade crossing on Main street by building an overhead bridge, and the citizens of the North End are pushing the scheme.

**Raleigh, N. C.**—The covered wooden bridge over Crabtree Creek, three miles north of this city, is to be replaced by an iron or steel span.

**Shamokin, Pa.**—Councils have appointed a committee to act in conjunction with the board of trade regarding the erection of an iron bridge over Shamokin Creek, the Northern Central and Philadelphia & Reading, near the Cameron colliery.

**St. Charles, Mo.**—Congressman Treloar, Feb. 6 introduced in the House at Washington a bill providing for the construction of a wagon and street railroad bridge over the Missouri River, at St Charles, Mo. The persons to whom the bill grants the franchise are: Theodore Bruere, Henry B. Denker, A. F. Mispagel, O. J. Marten, C. W. Prasser, W. F. Bloebaum, B. L. Emmons, L. Ringe, Henry F. Pieper, A. Runge and J. T. Rauch. The bill authorizes the construction of the bridge at a point at least one-third of a mile from any other bridge, to be selected consistent with the interests of river navigation. The conditions require that the bridge shall be built as a high bridge, all spans over the waterway to have a clear channel of not less than 400 ft. and a clear head room of not less than 55 ft. above high-water mark. It must be completed within five years. Accompanying the scheme is one for an electric line from St. Charles to St. Louis.

**Sunbury, Pa.**—The Grand Jury has approved the report of the Viewers recommending a new county bridge over Warrior Run Creek, in Lewis township.

**Syracuse, N. Y.**—A bill has been introduced in the Legislature for a lift bridge over the Erie Canal at Catherine street. The cost of the bridge will be equally divided between the state and the city.

**Tallahassee, Fla.**—The following bids were received Jan. 25 for a combined railroad and highway bridge for the Tallahassee & Montgomery Railway Company: G. H. Crafts, $22,800; Pittsburgh Bridge Co. (metal work delivered but not erected), $16,200; Gude & Walker, $21,100; Union Bridge Co., $19,500; Edge Moor Bridge Works, $18,087; Watkins & Hardaway, $17,000. The contract was awarded to the Edge Moor Bridge Works. The bridge is to be 183 ft. long, with a 22-ft. roadway, also a 50-ft. plate girder approach span at each end.

**Washington, D. C.**—The Senate has passed the bill, previously passed by the House, to extend till February, 1898, the time for completing the railroad bridge over the St. Lawrence River, in St. Lawrence County, New York.

**Wellsboro, Pa.**—Viewers have been appointed on a proposed county bridge over the Tioga River in Richmond Township at Carrol Camp.

**Winchester, Tenn.**—It is reported that an iron highway bridge with about 80 ft. span will soon be erected over Elk River.

**Youngstown, O.**—Bids as follows were received Jan. 25 for a superstructure for a bridge over the Mahoning River: Massillon Bridge Co., Massillon, O., $38,225; Wrought Iron Bridge Co., Canton, O., $37,960; Penn Bridge Co., Beaver Falls, Pa., $39,625; King Bridge Co., Cleveland, O., $54,760; Toledo Bridge Co., Toledo, O., $27,700 and $30,950; Pittsburgh Bridge Co., Pittsburgh, $42,650; Groton Bridge & Manufacturing Co., Groton, N. Y., $53,600 and $51,500; Variety Iron Works Co., Cleveland, O., $32,960; Champion Bridge Co., Wilmington, O., $49,650; Youngstown Bridge Co., Youngstown, O., $17,550 and $35,326.

## RAILROAD LAW—NOTES OF DECISIONS.

### Powers, Liabilities and Regulation of Railroads.

In Michigan it is held that the roadbed of a railroad cannot, under a city charter requiring that assessments be made according to benefits received, be assessed for the cost of paving a street which crosses it, where none of the company's buildings are within two blocks of the crossing.[1]

In the Supreme Court of the United States it is held that the statute imposing a tax on the gross receipts of transportation companies for tolls and transportation is not, in so far as it imposes a tax on tolls paid by a company engaged in interstate transportation to another company for the use of its railroad in the state, an interference with interstate commerce.[2]

In Missouri an ordinance granting a railroad the right to use a street for side-track purposes or depot stations is void.[3]

In Pennsylvania upon the completion of a connecting line, two railroad companies, being the joint owners of the line, agreed, through their general managers, to rules for the government of the road, which provided that a joint dispatcher should be appointed and paid by the two companies jointly, and removed at the instance of either; that the maintenance of the line should be divided between the companies so that each should have charge for 12 months at a time, specifying the company first to take charge; that the cost of maintaining the line, and other expenses, except the pay of the dispatcher, should be borne in proportion to the actual tonnage of the two interests; and that the adjustment of the tonnage in a specified manner should be made quarterly; and, after fixing charges for tolls and motive power, provided that all questions as to the management of the line should be referred to the general managers of the respective interests. The Supreme Court rules that such rules constituted a contract, subject to modification on the concurrence of both companies, and to either company's right to withdraw upon giving suitable notice.[4]

In Texas a common carrier transporting freight under contract for its shipment from one point to another in the same state by line of transit wholly within the state, and for its delivery on arrival at the latter point to another carrier for transportation out of the state, is held to be not engaged in interstate or foreign commerce.[5]

In Iowa it is held that the statute providing that a railroad shall not exempt itself from its liabilities as a common carrier, is not a regulation of interstate commerce, as applied to negligence in the carriage of passengers.[6]

### Injuries to Passengers, Employees and Strangers.

In Louisiana, a passenger on a train by invitation of the general agent of the railroad company, for the purpose of inspecting levees protecting the road, could recover for injuries received through the negligence of the company.[7]

In Kansas, one who knowingly takes passage over an unfinished railroad, and knows that there are no station facilities at his destination, cannot recover for injuries resulting solely from the company's failure to provide station facilities.[8]

In New York, in an action for injuries to plaintiff while a passenger on defendant's electric car, plaintiff claimed that, while he was sitting in a seat facing towards the front of the car, it suddenly gave a jerk, and threw him off. The court rules that such evidence was not sufficient to charge defendant with negligence, as the natural result of a sudden start would be, not to throw plaintiff off, unless he was sitting in a careless manner, but to throw him against the back of the seat on which he was sitting.[9]

In Louisiana the sudden and violent pulling of a bell rope in a passenger car, by an employee of the road, for the purpose of taking up the slack, whereby a passenger's eye was injured, is held to be "gross fault," within the Code, for which the passenger could recover.[10]

In Kansas in a suit by an employee for injuries received in using a defective appliance, it must be shown that defendant knew of the defect, or that the defect was of such a nature, or had existed for such a time, that, in the exercise of ordinary care, defendant should have discovered it.[11]

The Supreme Court of New York rules that though a brakeman knew of an overhead bridge which had no warning signals, and that it was low, he is not necessarily charged with contributory negligence, if, being occupied with the discharge of his duties, he took no notice of its near approach.[12]

In Kansas a servant, knowing of defects in a machine which render the employment dangerous, may continue in the employment for a reasonable time in reliance on the promise of the master to repair, unless the danger is imminent and obvious.[13]

In the Federal Court it is held that a civil engineer in the employ of a railroad, charged with the duty of looking after the building and maintenance of bridges, etc., assumes the risk arising from the absence of watchmen at a bridge on the road.[14]

The Supreme Court of Texas decides that an employee did not fail to exercise proper care, who, working on a bridge, and seeing a large timber swinging toward him, could have stepped aside out of its way, but, not having time to reflect, acted impulsively, tried to stop the timber with his hand, and was thrown from the bridge and injured.[15]

In the Federal Court it is held that where an engine was thrown from the track by running over calves which suddenly sprang in front of it, and, after running along the ties, turned over, the engineer could not recover from the receivers of the road for injuries received in the accident.[16]

In Missouri a railroad is bound to keep its road, track and yards in a reasonably safe condition for its employees, and it cannot avoid liability by letting out a part of its duties as a common carrier to an independent contractor.[17]

In Michigan a brakeman who enters the employment of a railroad company to work on a construction train, and who can see that the road is not finished, and that trees border it on either side, assumes the risk of being struck by a tree growing close to the track, and in plain view.[18]

In West Virginia a boy 16 years of age cannot be held to have assumed any risk of injury, or to have waived any duty owed him by the master, which one of his age and experience could not fully comprehend.[19]

In Tennessee the relation of master and servant does not exist between a railroad company and a physician employed by it to take care of men injured in its employment.[20]

In Missouri defendant's train hands saw plaintiff walking on the track about 400 ft. ahead of the train, and the whistle was sounded and the bell rung, to which he had paid no attention. When about 130 ft from him, an ineffectual attempt was made to stop the train, which overtook and injured plaintiff. The Supreme Court holds that an instruction that plaintiff had no additional right of recovery by reason of defective hearing and eyesight, unless the jury found that the trainmen had knowledge of such defect, and that, in the absence of such knowledge, they had the right to presume that he had ordinary sight and hearing, was correct.[21]

[1] Detroit, G. H. & M. v. Grand Rapids, 63 N. W. Rep., 1007.
[2] N. Y., L. E. & W. v. Com., 15 S. Ct., 896.
[3] Stevenson v. M. Pac., 31 S. W. Rep., 783.
[4] P. & R. v. R. F., 31 Atl. Rep. 1098.
[5] Nav. Co. v. Ins. Co., 31 S. W. Rep., 560, 685.
[6] Solan v. C. M. & St. P., 63 N. W. Rep., 692.
[7] Thompson v. Y. & M. V., 17 South. Rep., 503.
[8] K. & W. v. Frazer, 40 Pac. Rep., 923.
[9] Brennan v. C. H., 33 N. Y. S., 852.
[10] Thompson v. Y. & M. V., 17 South. Rep., 503.
[11] Carruthers v. C., R. I. & P., 40 Pac. Rep., 915.
[12] Fitzgerald v. N. Y. C. & H. R., 34 N. Y. S., 824.
[13] T. & S. F. v. Midgett, 40 Pac. Rep., 995.
[14] T. & P. v. Smith, 67 Fed. Rep., 524.
[15] S. A. & A. P. v. McDonald, 31 S. W. Rep., 72.
[16] Cent. Trust Co. v. E. T., V. & G., 68 Fed. Rep., 635.
[17] Burns v. K. C., Ft. S. & M., 31 S. W. Rep., 347.
[18] Manning v. C. & W. M., 63 N. W. Rep., 312.
[19] Turner v. N. & W., 22 S. E. Rep., 83.
[20] Quinn v. K. C., M. & B., 30 S. W. Rep., 1036.
[21] Candee v. K. C. & I., 31 S. W. Rep., 1029.

## MEETINGS AND ANNOUNCEMENTS.

### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Chicago & Alton*, quarterly, $2 per share, payable March 2.

*Cleveland & Pittsburgh*, quarterly, 1¾ per cent., on the guaranteed stock, payable March 2.

*Massillon & Cleveland*, 8 per cent., guaranteed by the Pennsylvania Railroad.

### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Missouri Pacific*, annual, company's office, St. Louis, March 10.

*Norfolk & Southern*, annual, company's office, Norfolk, Va., March 5.

*Philadelphia & Trenton*, annual, company's office, Broad street station, Philadelphia, Feb. 19.

*Pittsburgh & Castle Shannon*, annual, company's office, Carson street, south side, Pittsburgh, Feb. 18

*St. Louis, Iron Mountain & Southern*, annual, company's office, St. Louis, March 10.

*Tennessee Coal, Iron & Railroad*, annual, company's office, Tracy City, Grundy County, Tenn., March 11.

### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago. Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

**Ohio Society of Surveyors and Civil Engineers.**

The annual meeting of the Ohio Society of Surveyors and Civil Engineers will be held at Dayton, O., Feb. 25 to 27, 1896. Mr. C. A. Judson, Sandusky, O., is Secretary.

**New York City Local Freight Agents' Association.**

A local association of freight agents has been organized in New York city with officers as follows: President, P. H. Marshall, Baltimore & Ohio; Vice-President, M. Townsend, Pennsylvania; Secretary, F. H. Bandholtz, New York Central; Treasurer, L. W. Hildum, Erie.

**Western Foundrymen's Association.**

The next meeting of the Western Foundrymen's Association will take place at the Great Northern Hotel, Chicago, Wednesday evening, Feb. 19. The paper for the evening will be presented by Mr. H. Hansen, entitled "Crude Oil as a Fuel in the Core-Oven." There will be the usual topical discussion on questions relating to general foundry practice.

**Engineers' Club of Minneapolis.**

The following papers have been promised for the next meeting of this club, which occurs on March 2: Triangulation for Location of Tunnel for Discharge Pipes, East Side Pumping Station, by W. W. Redfield; Precise Level Bench Marks, by W. R. Hoag; and Measurement of a Base Line Under Difficulties, by A. B. Coe. The meetings are held in the office of the City Engineer in the City Hall, Minneapolis.

**The Civil Engineers' Society of St. Paul.**

A regular meeting of the society was held Feb. 3 with 14 members and 5 visitors present. President Stevens introduced Mr. Archibald Johnson who displayed the drawings and explained the details of the bear trap lock gates at Sandy Lake. Lieut.-Col. W. A. Jones, U. S. Eng. Corps, followed with suggestions as to the probable application of the bear trap weir, foreshadowed by its use at Sandy Lake. Inexpensive, simple in construction, easily repaired, self-cleaning and almost self-acting, the bear trap gate is destined to wide application. The Sandy Lake lock has been in almost constant operation during the winter, a temperature of perhaps 30 degs. below zero not having interfered with its work. With this form of lock Colonel Jones thought that the Great Lakes might be navigated without winter interruption. After some discussion the meeting adjourned.

## PERSONAL.

—Mr. C. A. W. Pownall, Chief Engineer of the Japanese Government Railroads, has resigned that office and will soon leave Tokio to return to England.

—Mr. C. H. Goodrich, until recently Freight Agent of the New England, has been appointed Superintendent and Traffic Manager of the Northern Alabama road.

—Mr. M. V. Meredith is the new General Manager of the South Haven & Eastern road, a narrow gage line in Van Buren County, Mich. He succeeds Mr. R. H. English.

—Mr. C. H. Knight, Chairman of the old Central Traffic Association Freight Committee, has been appointed assistant to Commissioner George R. Blanchard in New York.

—Mr. A. D. Ward is the new Purchasing Agent of the Chicago Great Western. He succeeds Mr. John Warwick, who recently went to the Seaboard Air Line in a similar capacity.

—Mr. H. F. Glenn has been elected a Director of the Jackson & Woodin Manufacturing Co., of Berwick, Pa., to fill the vacancy caused by the resignation of Mr. C. H. Zehnder, formerly President of the company.

—Mr. Sidney Broadbent, who has been General Superintendent of the Dickson Manufacturing Co.'s plant for many years, and has been in the service of the company for nearly 36 years, has resigned.

—Mr. George W. Klein has resigned as Superintendent of the Reading & Southwestern, an office which he has held since the organization of the company, a few years ago, because of pressure of other business.

—Mr. John B. Munson has been appointed Division Freight Agent on what is known as the Second Division of the Southern Railway. It embraces all points in North Carolina. The division agency at Charlotte has been abolished.

—Mr. L. F. Bower, who is now with the Carlisle Manufacturing Co. as Manager, will shortly resign that position to accept the office of Treasurer and Secretary of the Dickson Manufacturing Co. He will assume his new duties on March 1.

—Mr. T. W. Demorest, Assistant Engineer in the motive power department of the Pennsylvania at Columbus, has been transferred to be assistant to the Master Mechanic at the Indianapolis shops. He will be succeeded at Columbus by Mr. Samuel Miller.

—Mr. Percy S. Hildreth, who was formerly associated with his brother, R. W. Hildreth, in the firm of R. W. Hildreth & Co., civil and inspecting engineers, of New York, has formed a partnership with Mr. Alfred Liebmann to carry on the business of the old firm which was dissolved by the death of Mr. Hildreth, the senior partner.

—Mr. Clinton W. Sells has been appointed Manager of the Pike's Peak Cog Railroad. President H. S. Cable has been acting as Manager of the road since it opened, but he was recently elected President of one of the branch roads of the Chicago, Rock Island & Pacific, and is compelled to give up the active management of the Pike's Peak road.

—Mr. F. F. Whittekin, Chief Engineer of a number of small roads in Northern Pennsylvania, has been appointed Chief Engineer of a railroad in Colombia, South America, and will soon leave for that country. He will not resign his connection with the roads in Pennsylvania, but of course his active duties will be assumed by his assistants.

—Mr. William O'Herin, Superintendent of Motive Power and Machinery of the Missouri, Kansas & Texas, will hereafter have charge of the car department as well as the mechanical department, and his title has been changed to Superintendent of Machinery and Equipment. The office of Superintendent of the Car Department, formerly held by the late S. M. Irvin, has been abolished.

—Mr. C. F. Doane, formerly a well-known railroad passenger official, died last week at Hyannis, Mass., where he was born in 1846. Mr. Doane was connected with the railroad service for nearly 20 years, with the Atlantic & Great Western, the Erie and the New York Central. His last position was in charge of the emigrant business of the old Trunk Line Association, being Joint Agent of the Trunk Lines at Castle Garden for a number of years.

—Mr. Henry Wehrum has been made General Manager of the Lackawanna Steel and Iron Co., succeeding Mr. C. McKinney, who recently resigned on account of ill health. Mr. Wehrum was formerly Chief Engineer of the Scranton Steel Co., and when that company was leased to the Lackawanna company Mr. Wehrum became Chief Engineer and General Manager of the consolidated company and has retained that position up to the present time.

—Mr. E. M. Roberts has been appointed Master Mechanic of the Southern Iron Car Line, with office at the shops of the company, at Atlanta, Ga. He assumed his new duties on Feb. 1. Mr. Roberts is an old railroad mechanical officer. He was with the South Carolina road for some years as Master Mechanic, and as Superintendent of Motive Power, when the company was reorganized as the South Carolina & Georgia. He resigned in September, 1894.

—Mr. W. P. Walker, Jr., Freight Traffic Manager of the Chesapeake & Ohio, has been appointed to represent the combined interests of the "Big Four" and the Chesapeake & Ohio in the Joint Traffic Association. He will have the title of General Agent of the "Big Four," as wall as his present title. Mr. Frank M. Whitaker, General Manager of the Kanawha Dispatch, is to succeed Mr. Walker on the Chesapeake & Ohio, with the title of General Western Freight Agent.

—The official announcement of Mr. George B. Reeves' appointment as General Traffic Manager of the Grand Trunk states that his jurisdiction will be over the Grand Trunk lines east of the Detroit and St. Clair rivers. It would appear from this that the Chicago & Grand Trunk and the Detroit, Grand Haven & Milwaukee, of which Mr. Reeves was formerly Traffic Manager, will continue to be operated as heretofore, with a separate management for their traffic departments.

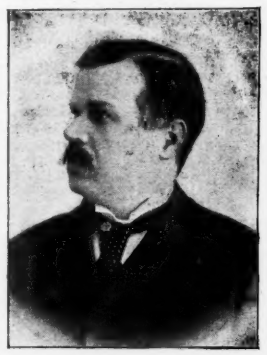
—Mr. H. D. Badgley has been appointed Assistant General Passenger Agent of the Chicago Great Western, at Chicago, and will assume his duties on March 1. Mr. Badgley is now the New England Passenger Agent of the Chicago, Burlington & Quincy, as he has been for the last nine years. Prior to 1887 he was one of the Burlington's traveling passenger agents. This position on the Chicago Great Western has been vacant since the resignation of Mr. D. W. Cooke, who left to take a similar position with the Erie.

—Mr. C. A. Barnard has been appointed Assistant General Freight Agent of the Ohio Southern. He now holds a similar position on the Cleveland, Akron & Columbus. Mr. Barnard was formerly with the Big Four as Freight Agent at Cincinnati, and had previously been in the service of the Ohio & Mississippi. In 1894 he went to the Cleveland, Akron & Columbus in the position he now holds. On the Ohio Southern he will have charge of the coal traffic, an important and rapidly growing traffic on that line.

—Mr. William M. Sage, Freight Traffic Manager of the Chicago, Rock Island & Pacific, died at his home in Chicago on Thursday of last week. Mr. Sage had been stricken with paralysis while at his office on the morning of the previous day. He had a long career with the Rock Island Company, being in its employ nearly 30 years, since 1867, all that time in the traffic department. After serving in clerical positions he became Assistant General Freight Agent and in 1878 General Freight Agent. Ten years later he was appointed to the office which he held at the time of his death.

—Mr. William Wainwright, Assistant General Manager of the Grand Trunk road, has resigned that position, but it is stated that he will continue in the service of the company, though in what capacity Mr. Wainwright says he himself does not know. The office of Assistant General Manager which he has held for the last 15 years will be abolished. Mr. Wainwright has been with the Grand Trunk altogether about 33 years. His first position was as Secretary to the then Managing Director of the Grand Trunk, Mr. Brydges. Later he was General Passenger Agent, and within a few years afterward was promoted to the office which he has held so many years.

—The election of Mr. C. H. Zehnder as President of the Dickson Manufacturing Co., of Scranton, Pa., was noted in these columns last week. Mr. Zehnder is the President of the Jackson & Woodin Manufacturing Co., of Berwick, Pa., but will resign that office to take up his new work. He has been President of the Jackson & Woodin Company for the last three years and has held many positions with the company during the 17 years he has been in its employ. His first position was as Clerk to the late C. G. Jackson, then Vice-President and General Manager, and he was promoted successively to be Secretary, Superintendent, Vice-President and General Manager, and finally President. During that time the business of the company has increased greatly both in volume and variety of products; more particularly in recent years, under Mr. Zehnder's management, the business has been developed to include many branches, outside of the regular car-building interests. In his new position Mr. Zehnder will give his first attention to increasing the present facilities of the Dickson Manufacturing Co.'s plant; it is also proposed to take up varieties of work not heretofore carried on there. The Dickson Company has an excellent name as a builder of locomotives and mining machinery, the Dickson-Corliss engine and a variety of stationary engines. The capacity of the plant for this class of work will be increased and arrangements made to provide for building boilers and engines for electric plants.



## ELECTIONS AND APPOINTMENTS.

*Atchison, Topeka & Santa Fe.*—The position of General Roadmaster of the Chicago Division, now held by E. Raymond, has been abolished. The position now held by R. J. Parker, of Topeka, as General Roadmaster of the Eastern Division, Emporia to Kansas City, has also been abolished. Mr. Parker will become Roadmaster between Kansas City and Burlingame. E. Morrisey, who has been Division Roadmaster in this territory, has been given that division between Burlingame and Moline, Ill.

*Boston & Maine.*—O. W. Greeley has been appointed General Baggage Master in place of Mr. W. R. Brackett, resigned. Mr. Greeley has been Assistant General Baggage Agent of the Boston & Maine since last June, and was in former years with the Boston & Lowell.

The Nashua & Keene and Acton branches of the Boston & Maine, formerly a part of the Southern division, have been placed in charge of Mr. Frank Barr, Superintendent of the Worcester, Nashua & Portland division.

*Brainerd & Northern Minnesota.*—B. F. Nelson is now General Manager, with office at Brainerd, Minn. F. W. Pike having resigned, C. W. Schneider has been appointed Auditor.

*Buffalo & St Mary's.*—Following is a full list of the officers of this Pennsylvania Company: Andrew Kaul, President; B. Frank Hall, Vice-President; G. C. Simons, Secretary and Treasurer; J. K. P. Hall, General Manager; B. E. Wellendorf, General Superintendent, Chief Engineer and Purchasing Agent; B. E. Cartwright, General Freight and P. Agent, and L. P. Snyder, Auditor, all of St Mary's, Pa.

*Chesapeake & Ohio.*—President Ingalls has issued the following circular making important changes in the freight traffic department of the company. All changes take effect on Feb. 15:

W. P. Walker, Jr., appointed Freight Traffic Manager, in charge of all freight traffic and seaboard coal, reporting direct to the President. Headquarters, 362 Broadway, New York City. F. M. Whitaker, Assistant Freight Traffic Manager, headquarters at Cincinnati, O., in charge of all eastbound freight traffic, and export and import business through Newport News direct; also of the local road and branches and the territory Cincinnati to the Big Sandy River, reporting to the Freight Traffic Manager. A. G. Troup, Assistant Freight Traffic Manager, headquarters at 362 Broadway, New York City, in charge of the eastern territory north of the Potomac River, and of all westbound business therefrom, and to assist the Freight Traffic Manager in general duties, reporting to the Freight Traffic Manager. E. D. Hotchkiss, General Freight Agent, headquarters at Richmond, Va., in charge of Virginia and West Virginia and the southeastern territory, and of all westbound business therefrom, and of the local road, branches and territory east of the Big Sandy River, also of the tariff and claim departments, reporting to the Freight Traffic Manager. Don Alexander, Assistant General Freight Agent, headquarters at 352 Fourth Avenue, Louisville, Ky., in charge of Louisville and the South and Southwest, and the local road and the territory Louisville to Ashland, Ky., and the Ohio and Big Sandy Railroad, reporting to Assistant Freight Traffic Manager at Cincinnati. Charles L. Brown, General Agent, headquarters at Lexington, Ky., in charge of Lexington and Central Kentucky, reporting to the Assistant General Freight Agent at Louisville. G. W. Benjamin, Coal and Coke Agent, headquarters at Cincinnati, O., in charge of all westbound coal and coke business, reporting direct to the President. Messrs. Hotchkiss, Alexander and Benjamin retain the titles which they formerly held. Mr. Benjamin was formerly an Assistant General Freight Agent.

*Chesapeake & Western.*—John B. Walker is now Acting Chief Engineer of the railroad. He was formerly Division Engineer for the Old Dominion Construction Co., which is building the road, at Harrisburgh, Va.

*Chicago, Burlington & Quincy.*—Mr. L. N. Hopkins, formerly Auditor of Ticket Accounts, has been made Commissary of the company, and Mr. R. L. Porter has been appointed to the position formerly held by him.

*Chicago, Peoria & St. Louis.*—The Board of Directors of the company met at Springfield, Ill., last week, and organized by electing the following officers: President, Henry W. Putnam, of New York; Vice-President and General Manager, Charles H. Bosworth, of Springfield; General Solicitor, Maj. Bluford Wilson, Springfield; Secretary and Treasurer, Charles D. Moyer, of Chicago.

*Cleveland, Cincinnati, Chicago & St. Louis.*—The positions in the operating department of the Michigan Division, made vacant by the dismissal of a number of the division officers, as noted last week, have been filled by the appointment of the following officers: John Fitzpatrick, formerly on the Sandusky Division, to be Supervisor of Bridges and Buildings; Harry Van Gorden, now employed in the Cincinnati yards as Roadmaster, and John Burge, now at Wabash as Section Foreman.

*Cleveland & Southwestern.*—This company, recently incorporated in Ohio, has been organized by the election of the following officers: President, Thomas Beer, of Bucyrus, O.: Vice-President, William C. Beer, of New York; Secretary, Robert Beer, of Bucyrus; Treasurer, W. A. Blicks, of Bucyrus.

*Dayton & Union.*—Mr. E. F. Cost, the new General Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed to that office also on this road, which is operated by the Big Four.

*Denison, Bonham & New Orleans.*—The stockholders met at Denison, Tex., Jan 28, and elected the following directors: John W. Russell, J. T Arledge, T. N. Thompson and A. B. Scarborough, of Bonham; C. S. Cobb, G. L. Blackford, J. T. Munson, A. F. Platter and R. C. Foster, of Denison. The directors elected R. C. Foster, of Denison President; John W. Russell, of Bonham, Vice-President; J. T. Munson, of Denison, Treasurer, and J. R. Handy, of Denison, Secretary.

*Eastern Kentucky.*—Sturgis G. Bates has been appointed General Freight Agent of this company, vice George Gibbs, who has been appointed Real Estate Agent and Engineer, with office at Riverton, Ky.

*Indianapolis Union.*—The following Directors were elected last week: Directors, Demas Deming, Terre Haute; M. A. Downing, J. A. Hanson, J. H. Holliday, Indianapolis; W. P. Ijams, D. W. Minshall, Terre Haute; S. E. Rauh, Henry Schnull and John C. Wright, Indianapolis. The directors have elected the following officers: President, W. P. Ijams, Terre Haute; Vice-President, M. A. Downing, Indianapolis; Secretary, John H. Holliday, Indianapolis; Traffic Manager, H. C. Graybill, Indianapolis.

*Northern Alabama.*—C. H. Goodrich has been appointed Superintendent and Traffic Manager, with headquarters at Sheffield, Ala.

*Southern.*—At a meeting of the Directors of the company, in New York City, on Feb. 10, Samuel M. Inman, of Atlanta, Ga., and George W. Maslin, of New York, were elected members of the Board to succeed Thomas F. Ryan and Gen. Samuel Thomas. The retirement of the Messrs. Ryan and Thomas was due to the requirements of certain Southern State laws, which prohibit directors of a railroad company from holding office with a competing company. Messrs Ryan and Thomas recently acquired control of the Port Royal & Western Carolina road.

*Tallahasse & Montgomery.*—The directors at a recent meeting at Montgomery, Ala., elected Capt. A. J. Millstead, of Tallahassee, President; J. A. Gee, of Atlanta, General Passenger Agent; R. E. Lutz, of Montgomery, General Freight Agent; T. J. Hunter, of Atlanta, Auditor. All these, excepting the President, are officers of the Atlanta & West Point and Western Ry., of Alabama. The new road is only seven miles long.

*Wellston & Jackson.*—W. A. Mills, Vice-President, announces the following appointments: Superintendent, M. S. Connors; General Passenger and Ticket Agent, W. H. Fisher; General Freight Agent, H. B. Dunham; Engineer Maintenance of Way, William Michel, all with offices at Columbus, O. This company operates freight trains over 10 miles of its road, and the steam equipment is furnished by the Columbus, Hocking Valley & Toledo. The operating officers named are all connected with that company.

## RAILROAD CONSTRUCTION,

### Incorporations, Surveys, Etc.

**Alameda & San Joaquin.**—The contract for building this railroad is reported awarded to John Kelso. The line is to be about 30 miles long from Stockton, on the San Joaquin Valley, to mines near Corral Hollow. The contractor is to begin work within 10 days and complete the grading by April. The local papers give the following as the prices at which the contract was awarded: Grading, solid rock, 30 cents a cubic yard; grading, loose rock, 18 cents; excavating gravel, 10 cents; excavating earth, 10 cents; borrow embankment, gravel, 8 cents; borrow embankment, earth, 8 cents; clearing, where actually done, $25 an acre; grubbing, where actually done, $5 a station; overhaul, at the rate of one cent a cubic yard for each 100 feet in excess of 600 feet; riprap, at 60 cents a cubic yard. Hugh Fox is Superintendent of Construction and George A. Atherton, of Stockton, is Chief Engineer.

**Arkansas & Choctaw.**—The bill to authorize this railroad company to construct a road through the Choctaw Nation lands in Indian Territory has passed the United States Senate. The proposed road is to begin on the boundary line between the Choctaw Nation and the County of Little River, Ark., and extend northwesterly through the Choctaw Nation to the town of Atoka. The road is to connect with the Kansas City, Fort Scott & Gulf. R. H. Keith, of Kansas City, is President, and Samuel West, of St. Louis, is Treasurer.

**Blue Ridge.**—A bill to grant a charter to this company has been introduced in the Virginia Legislature. The company is authorized to build a road on the west side of the Blue Ridge Mountains, from Roanoke to Radford, which are now connected by the main line of the Norfolk & Western Another line is also authorized southwest from Roanoke to Hillsville and Independence.

**Buffalo & St. Marys.**—The grading is practically all completed on this road in Northern Pennsylvania, as reported last week, and the company expects to have the road ready for operation by May 1. All of the work is being done by the railroad company under the supervision of B. E. Wellendorf, Chief Engineer, and his Assistant, Mr. Chas. A. Chatham. At the present date the track is laid for about two miles, and some 300 men are at work on the road. During 1895 1½ miles of track was laid, from the junction at St. Marys to the point where the road crosses over the P. & E. Division of the Pennsylvania. Considerable delay was occasioned at this point by objections of the Pennsylvania Railroad, but a week ago the bridge was completed, and locomotive and cars now pass over. There are no trestles or tunnels on the road and only one steel bridge. The steel girder bridge at the crossing referred to has an oblique clear span of 68 ft. 8 in., and clears the top of the Pennsylvania Railroad rail vertically 22 ft. It rests on two first-class stone abutments, each 30 ft., at right angles from the center between the P. R. R. tracks. The construction work has not been difficult, although there have been sections involving some heavy grading, which included earth, loose and solid rock; but of the latter there was only a small proportion. One cut involved 50,000 cu. ft. of excavation. The heaviest grades are about 75 ft. to the mile, but the entire route is along the top of a mountain. The road is being built as an extension of the St. Marys & Southwestern, and will, when completed from its junction at St. Marys to the terminus at Clermont, Pa., at which latter place it will connect with the Western New York & Pennsylvania, afford a direct route to the north and the lakes for the large body of high-grade bituminous coal underlying the region of the Toby Valley, in the southern and central part of Elk County, known in the market as Shawmut mines coal. The distance will be almost exactly 24 miles, and the route follows along the summit of the divide that separates the Eastern from the Western waters, through a hemlock and hardwood forest. All but about the first three miles passes through woods. The grading for the road has all been done, as stated, except at a few places near the midway sections, but this will be completed by the time the track reaches these points The names of officers are given in another column.

**Central Washington.**—Local reports are authority for the statement that the road will be built out of Coulee City as far north as the Columbia River in the early spring, the terminus being at Bridgeport. The new line would give the company considerable traffic from Okanogan County.

**Decatur, Columbus & New Orleans.**—A press dispatch from Decatur, Ala., gives the rather indefinite information that new parties are considering the purchase of the right of way and franchise of the railroad projected from Decatur to Columbus, Miss.

**Depew & Southwestern.**—This company has appealed to the Appellate Division of the New York Supreme Court from the action of the State Railroad Commission in refusing the company a charter to operate a road 10 miles in length in Erie County, from Depew to Blasdell, a station on the Lake Shore & Michigan Southern, southwest of Buffalo. A certificate was granted to the Terminal Railway Co, of Buffalo. The routes over which the two companies proposed to build were practically parallel. The history of the contest has been told not infrequently in these columns, but as the litigation involves some interesting questions, we repeat some facts already reported. The two railroad companies were formed in June, 1895. The articles of association of the Terminal Railway of Buffalo were filed in the office of the Secretary of State on June 17. The articles of association of the Depew & Southwestern were filed on June 15. The two applications for certificate authorizing construction were heard simultaneously by the Board of Railroad Commissioners. The Board decided to issue the certificate to the Terminal Railway of Buffalo. It denied the application of the Depew & Southwestern.

The decision of the Board was sustained by the Supreme Court, General Term, in October last. The appellant company contends that the Board has committed an error by the refusal to hold that, by reason of the filing of articles of association two days prior to the filing of the articles of the Terminal Railway of Buffalo it obtained vested legal rights which entitled its application to determine before the Board could take up an application by another corporation.

**Florida East Coast.**—The extension of the road southward toward Biscayne Bay, Fla., will be finished as far as Fort Lauderdale, on New River this week. A steamer will then make regular trips between Fort Lauderdale and Miami in connection with the railroad.

**Georges River.**—This road is to be extended about a mile from Union, Me., to the Union line quarries. The new line will be over a level country, and will be built by James Mitchell, of Portland, Me.

**Gulf, Rio Grande & Pacific.**—It is announced at Monterey, Mexico, that the concession for the extension of the Monterey & Mexican Gulf road to build from Trevino to Sierra Mojada and thence to the Port of Mazatlan, on the Pacific Coast, has passed into the hands of Morris R. Locke, the railroad contractor, and B. C. Faurot, of Columbus, O., who have organized this company. The Government will give a subsidy of $8,000 for each mile constructed in addition to the line from Tevino to the Pacific Coast. The concession embraces the construction of a road from a point between the stations of Cadereyta Jimenez and Monte Morelas, on the Monterey & Mexican Gulf line, to a point on the Rio Bravo, between Laredo and Guerrerro, and from a point between Linares and Villa Geran on the Monterey & Mexican Gulf Railway to the mining towns of San Carlos and San Nicholas.

**Lake Erie, Alliance & Southern.**—The officials of the Company are said to be contemplating the extension of the road from its southern terminus at Bergholz to Steubenville, O., and several routes are under consideration.

**Lehigh & New England.**—J. C. Miller & Co., contractors of Bangor and Nazareth, Pa., have the contract for building eight miles of this road between Pen Argyle and Bender's Junction, Pa. The Lehigh & New England is that portion of the old Poughkeepsie Bridge route, east of the Hudson River, and it operates a line from Slatington, Pa., to Campbell Hall, N. Y., on the west side of the Hudson River, about 95 miles. This route has been made up by leasing trackage rights for about 40 miles on three sections of the route. One of these is the section between Bender's Junction and Pen Argyle, this track being owned by the Lehigh & Lackawanna (Central of New Jersey). The company will build its own road of the other sections where it now has running rights over the Erie and the New York, Susquehanna & Western.

**Louisville & Nashville.**—Citizens of Pine Apple, Ala., have offered to build a line to that town from the nearest point on the Louisville & Nashville if that company will operate it. The proposition is under consideration by the officers of the company.

**Marion & Rye Valley.**—This project has been revived, and it is stated that the construction work, which has been suspended for something like three years, will be resumed this month. The road is a short line to reach mining properties, and is to extend from Marion, Va., to iron ore deposits in Curran Valley, about six miles. Two bridges are to be built of 200 ft. and 110 ft. long over the Holston River and Staley's Creek respectively. An extension of about 12 miles to Rye Valley may be built this year. Further extensions, which would make the total length of the line nearly 50 miles, have been projected, but it is not likely that much more than 20 miles of road will be built this year. P. S. Swain, of 80 Wall street, New York, is President; John S. Apperson, of Marion, Va., is Secretary, and David Fox, Jr., of Suffern, N. Y., is the present Chief Engineer.

**Mexican Central.**—About 12 miles of the branch from Guadalajara toward Ameca have been approved by the Mexican government.

**Mexican Roads.**—The construction of a railroad from Guaymas, Mex., to Cocorit, in the Yaqui Indian country, will begin as soon as the material, now on the road, reaches Guaymas. The road will be 120 kilometers long, and will pass through a rich mineral and agricultural country. The concession for the road is owned by Thomas A. Rask.

**Muscogee, Oklahoma & Western.**—The survey of the railroad has been completed from Enid, Okla., to Muscogee, I. T. This road will start from Enid, crossing the Rock Island at that point, the Atchison at Perry, the St. Louis & San Francisco near Sapulpa, the Missouri, Kansas & Texas at Muscogee and the Missouri Pacific at Fort Gibson, and then to Fayetteville, Ark. The route is along the south bank of the Arkansas River from Enid to Muscogee.

**Ottawa, Arnprior & Parry Sound.**—The Ontario and the Dominion Government engineers have just completed the inspection of the last part of the Western end of the line. Eight miles of road, which completes the line to the waters of the Georgian Bay, at Parry Sound, were inspected. Mr. Thomas Ridout was the engineer for the Dominion Government.

**Phillips & Rangeley Lake.**—Messrs. A. L. Matthews and Elmer Snowman have just finished a preliminary survey of the proposed extension of the road to Kennebago Lake, Me., from the present terminus at Dead River, and found an easy route, without deep cuts or large fills, passing through good timber land.

**Rio Grande Western.**—Grading on the extension between Sevier, Utah, and Richfield, is going on with a small force. Trains will probably be running over the 15 miles of new road in May.

**Southern Pacific.**—The coast division was placed in operation to a point 11 miles below Guadaloupe on Feb. 1. A station, to be known as Casmalia, will be established at this place. By May 1 the road will be in operation to the south side of the Santa Ynez River, where a station, known as Lompoc Junction, will be established 26 miles south of Guadaloupe, the present terminus of the coast division. From this point the Southern Pacific proposes to build a branch line into Lompoc, a distance of eight miles, provided it can get a right of way free.

**South Haven & Eastern.**—M. V. Meredith, General Manager has under consideration a proposition to build a branch of this narrow gage road from Toquin to Paw Paw Lake, Mich. The projected line would be in operation only during the summer resort season, and would furnish a desirable route for Chicago passengers to the resorts at Paw Paw Lake.

**St. Louis, Oklahoma & Southern.**—A bill to grant a charter to this company to construct a road through the Indian Territory has passed the National House of Representives. The company is authorized to build from a connection with the St. Louis & San Francisco, at Sapulpa, I. T., westerly and southerly to Stonewall on the Red River and thence into Texas.

**Tallahassee Southeastern.**—Mr. Edward Lewis, of Tallahassee, Fla., now President of this company, which has succeeded the Florida, Georgia & Western, states that construction work will probably be resumed near Tallahassee, Fla., this month. The former company built about six miles of track southeast of Tallahassee several years ago, and graded altogher 40 miles of track to near Ancilla. This roadbed will be repaired and the line then extended toward Oldtown on the Suwanee River.

**Texas Midland.**—The possibility of the extension of this road from its present north and south terminals is again being discussed. This proposition has been talked of since Mr. E. H. R. Green became President of the company and surveys have been made. The present idea is suggested in a press dispatch as follows: President Green has been in St. Louis conferring with the officers of the St. Louis & San Francisco. He said that in the event of the separation of that road from the Atchison he was prepared to construct certain branch and auxiliary lines which would give a line from St. Louis to Central Texas by a route many miles shorter than that which exists. From St. Louis to Paris, Texas, the St. Louis & San Francisco will be used. From Paris to Greenville there is a gap that President Green proposes to fill. From Greenville to Ennis the Texas Midland is in operation and between Ennis and Waco there is also a gap of 65 miles. To Dallas from Quinlan, a point on the Texas Midland, there is an unfilled section of 62 miles. Lack of space prevents us from specifying other "gaps."

**Wisconsin & Michigan.**—The Peshtigo Harbor Railroad, which consists of seven miles of track and several locomotives, with docks at Peshtigo Harbor, Wis., and sites for a station and shops in the village of Peshtigo, was sold last week to the Wisconsin & Michigan Railroad. The consideration is said to be $50,000.

### Electric Railroad Construction.

**Allegheny, Pa.**—The survey for the extension of the Sharpsburg, Etna & Millvale branch to Glenshaw has been completed by the Allegheny Traction Co.

**Asbury Park, N. J.**—The Town Board of Long Branch has granted a franchise to the Atlantic Coast Electric Railroad Co. to build a road from Asbury Park to Long Branch. The road will have about 14 miles of track, and will require a bridge 1,200 ft. long. C. A. Hammond, Asbury Park, is General Manager.

**Baltimore, Md.**—The Columbia & Maryland Electric Railway Co. has awarded the contract for the electrical equipment of its two power houses to the Westinghouse Electric & Mfg. Co., of Pittsburgh. The contract is for eight 700 kw generators, switchboards and panels, and specifies that the first generator in each power-house is to be ready for operation by May 15. The contracts for the overhead equipment will soon be awarded.

**Charlevoix, Mich.**—A franchise for an electric railroad has been granted to the Charlevoix Electric Light Co. Charles Gabriel is Manager.

**Fort Dodge, Ia.**—The Fort Dodge Electric Light & Power Co. has completed its plans for the electric street railroad and work will be commenced April 1. About three miles of track will be laid this year.

**La Salle, N. Y.**—The Buffalo & Niagara Falls electric road proposes to build a new line from the end of Warner avenue, below Tonawanda, running back or north of the railroads, to Niagara street at Niagara Falls.

**Lorain, O.**—The new East Lorain electric road, two miles long, was opened for travel last week.

**Pittsburgh, Kan.**—The Pittsburgh, Frontenac & Suburban Electric Railway Co. is purchasing material for the extension of the road. The first extension built will be to Yale, Minden, Midway and Litchfield, and when this is done work will be begun on the Missouri extension.

**Pottstown, Pa.**—The right of way for the proposed electric road between Pottstown and West Chester has been secured, and subscription books for stock are now open. The line will be 22½ miles in length from Pottstown, by way of the State road through Bucktown, Pughtown, into Eagle and Lionville. Leaving Downingtown at the southeast, the line will enter West Chester by way of Exton and Whiteland. A. G. Ash, of Pottstown, is General Manager.

**Salt Lake City, Utah.**—The plans for an electric street railroad to extend from Fifth street, connecting with lines running east of the city, are now in definite shape and a franchise will soon be asked for. The company will be known as the East Bench, University & Southern.

**San Francisco, Cal.**—The railroad to the bay shore, of which Mayor Sutro is President, has begun running cars over its line. The road is an overhead trolley and is not a very important one, beyond being the beginning of competition with the Market street railroad system which controls nearly all the street car lines in the city, having 186 miles of track.

**Templeton, Mass.**—The Templeton Street Railway Co. has been incorporated by Isaac Baum, S. F. Greenwood, John F. Chamberlin and C. E. Ingalls, with a capital stock of $50,000.

**Warren, Pa.**—The Warren Street Railway Co. has asked the council for permission to extend the road on Second, Third, Market, Fifth and Conewago streets. The company also expects to build the road to North Warren. It is thought that an electric road will be built from Sugar Grove to North Warren to connect with this extension.

**Wilkes-Barre, Pa.**—The projectors of the Harvey's Lake and Dallas Electric Railroad intend to build the line from Luzerne Borough to Plymouth, going through Larksville, Welsh Hill and East Plymouth.

**Yonkers, N. Y.**—Plans are being prepared for a two-story brick power house, car storage and repair shop for the Yonkers Electric Railroad Co. at Buena Vista avenue and Main street, to cost $40,000.

## GENERAL RAILROAD NEWS.

**Atchison, Topeka & Santa Fe.**—The earnings for various lines of the company for December and the half year are given below, the first report being for all lines:

| *December:* | 1895. | 1894. | Inc. or dec. |
|---|---|---|---|
| Gross earn. | $3,627,000 | $3,418,489 | I. $208,511 |
| Oper. exp. | 2,516,764 | 2,386,789 | I. 129,975 |
| Net earn | $1,110,236 | $1,031,700 | I. $78,536 |
| *Six months:* | | | |
| Gross earn. | $20,675,928 | $20,162,237 | I. $512,791 |
| Net earn. | $5,758,051 | $5,857,043 | D. $598,989 |
| ST. LOUIS & SAN FRANCISCO | | | |
| *December:* | | | |
| Gross. | $502,010 | $507,257 | D. $5,247 |
| Net. | 204,708 | 215,557 | D. 10,849 |
| *Six months:* | | | |
| Gross earn. | $3,243,396 | $3,318,877 | D. $75,481 |
| Net earn. | 1,363,547 | 1,517,282 | D. 153,735 |
| ATLANTIC & PACIFIC. | | | |
| *December:* | | | |
| Gross earn. | $327,929 | $294,329 | I. $33,600 |
| Net earn. | 54,937 | 48,031 | I. 6,906 |
| *Six months:* | | | |
| Gross earn. | $1,869,366 | $1,632,467 | I. $236,899 |
| Net earn. | 178,322 | 303,556 | D. 125,234 |
| ATCHISON PROPER. | | | |
| *December:* | | | |
| Gross earn. | $2,797,390 | $2,617,232 | I. $180,158 |
| Net earn. | 850,518 | 768,039 | I. 82,479 |
| *Six months:* | | | |
| Gross earn. | $15 562,591 | $15,211,316 | I. $351,375 |
| Net earn. | 3,716,111 | 4,036,131 | D. 320,020 |

**Chicago Great Western.**—President Stickney announced to the newspapers last week that he had succeeded in negotiating in England a loan for $1,000,000 for five years at six per cent. interest. The funds are to be used in improvements to the roadbed.

**Chicago, Peoria & St. Louis.**—The reorganized company has taken charge of this property, the only change in the title being the substitution of "railroad" for "railway," the old company's title. The capital stock of the new company is $5,000,000, one-half of this non-cumulative 5 per cent. preferred stock. The company will operate the following lines: From Pekin to East St. Louis, by way of Havana and Springfield; also, from Havana to Jacksonville; also, from Havana to Rock Island, through the counties of Fulton, Knox, Henry, Mercer and Rock Island. The principle office is to be maintained at Springfield. Henry W. Putnam, Jr., of New York, is the new President of the company. Charles H. Bosworth, of Springfield, Ill., will continue as General Manager.

**Delaware River Railroad & Bridge Co.**—The Pennsylvania & New Jersey Railroad which was organized in Pennsylvania and New Jersey about a year ago by officers of the Pennsylvania, has been reorganized under the above name. The legal title to the new Pennsylvania bridge across the Delaware River between Frankford and Camden and the connecting tracks on both sides of the river will be vested in this subsidiary corporation.

**Detroit, Lansing & Northern.**—The Treasurer has issued a circular to security holders explaining a new plan of reorganization. The plan of March 6, 1894, he says, did not receive the assent of enough security holders to assure its success. The principal features objected to in that plan have been avoided in the new scheme. It is now proposed that suits shall be brought for the foreclosure of the several first mortgages on the component parts of the system, except the Ionia & Lansing first mortgage, which will not be disturbed, and that the different properties shall be bought at foreclosure sale by the committee representing the bondholders, who shall become parties to the reorganization plan. A new corporation will be organized by the purchasers, which will take over the purchased roads, issuing its securities in payment therefor. The securities of this company required for exchange of the securities of the present company will be as follows: New four per cent. general mortgage bonds, $3,912,918; new five per cent. preferred stock, $3,066,047; new common stock, $2,510,000. The company will retain in its treasury new general mortgage four per cent. bonds to the amount of $2,087,081. These bonds will retire $770,000 Ionia & Lansing five per cent. bonds at maturity, and will provide, by exchange or purchase if desirable, for the $317,000 securities of terminals at Detroit, now held by private parties in the interest of the railroad. The balance of new four per cent. bonds will be held for acquirement of any properties deemed necessary to secure a greater revenue for the road. The new plan provides for the issue of $6,000,000 first general mortgage bonds, $3,066,047 five per cent. preferred stock, and $2,510,000 common stock. The reorganization committee is composed as follows: H. H. Hunnewell, Nathaniel Thayer, Alpheus H. Hardy, of Boston, and Mark T. Cox and James Timpson, of New York.

**Great Northern.**—The earnings for January and the seven months are given below:

| *January:* | 1896. | 1895. | Increase. |
|---|---|---|---|
| St. P., M. & M. leased lines. | $852,415 | $689,911 | $162,504 |
| Eastern Ry. of Minn. | 105,468 | 86,170 | 19,298 |
| Montana Central Ry. | 154,598 | 105,858 | 48,740 |
| Total for system | $1,112,481 | $881,938 | $230,543 |
| *Seven months to Jan. 31:* | | | |
| St. P., M. & M. leased lines. | $10,511,779 | $8,869,388 | $1,642,371 |
| Eastern Ry. of Minn. | 1,235,662 | 995,520 | 240,142 |
| Montana Central Ry. | 965,229 | 928,501 | 36,728 |
| Total for system | $12,712,670 | $10,796,429 | $1,919,241 |

**Huntingdon & Broad Top.**—The company has consolidated its car trust obligations now outstanding. A Philadelphia banking firm subscribes for the 11 outstanding series and in place of them a new consolidated trust bond for $680,000 will be issued, covering the outstanding obligations. The issue will also give funds ssufficient to provide for betterments to the existing equipment. Under the new plan charges preceding dividends are reduced by $40,000 a year.

**Illinois Central.**—The following is the December statement of earnings:

| *December:* | 1895. | 1894. | Inc. |
|---|---|---|---|
| Miles operated | 2,888 | 2,888 | |
| Gross earn. | $2,095,154 | $1,751,486 | I. $343,668 |
| Oper. exp. | 1,248,940 | 1,114,942 | I. 133,998 |
| Net earn. | $846,214 | $636,544 | I. $209,670 |
| *Six months:* | | | |
| Gross earn. | 11,265,212 | 9,828,006 | I. 1,437,206 |
| Net earn. | $4,055,220 | $2,867,559 | I. $1,187,661 |

The gross receipts from traffic for the month of January, 1896, are estimated at $1,805,432; the receipts for January, 1895, were $1,609,156, an estimated increase of $196,276.

**Louisville & Nashville.**—The company makes the following report for the half year ending Dec. 31:

| | 1895. | 1894. | 1893 |
|---|---|---|---|
| Gross earn. | $10,720,081 | $10,186,878 | $9,755,923 |
| Oper. exp. | 6,835,639 | 6,109,095 | 5,881,346 |
| Net earn. | $3,884,442 | $4,077,783 | $3,874,577 |
| Total income | 4,060,568 | 4,257,627 | 4,036,517 |
| Total fixed charges | $2,968,955 | $3,857,193 | $2,922,837 |
| Surplus | 1,091,613 | 400,434 | 1,113,680 |

**Oregon Railway & Navigation Co.**—The general reorganization committee, A. S. Heidelbach, chairman, announces that the plan of reorganization dated Sept. 6, 1895, as amended Feb. 5, 1896, is operative. Holders of about $400,000 consolidated mortgage bonds and of $169,000 collateral trust mortgage bonds of the company, have not yet deposited their bonds, and have until Feb. 29 to do so, and assert to the reorganization plan.

**Pennsylvania.**—A committee of officers of the company is working out a plan for the consolidation of all the lines of the company in southern and western New Jersey, comprising the West Jersey, West Jersey & Atlantic, Camden & Atlantic, and a number of small branches.

## Electric Railroad News.

**Boston, Mass.**—The West End Street Railway Co. has recently ordered from the General Electric Co. four 1,200 kw generators and one of 1,500 kw.

**Cleveland, O.**—Henry A. Everett, who has been trying to get a franchise for an electric road on which a three-cent fare will be charged, has given up the project, as he says the council committees have put so many conditions in the ordinance that it is not practical to build the road.

**Dallas, Tex.**—The Elm Street Railroad was sold at receiver's sale last week to George W. Davenport, of Boston, representing Eastern bondholders, who bid $100,000.

**Middletown, Md.**—The Board of Managers of the Frederick-Middletown electric railroad has purchased 700 tons of rails for the road, which is the amount required for the track from Frederick to Middletown.

**Milwaukee, Wis.**—Plans for the reorganization of the Milwaukee Street Railroad have been made, and the securities of the new company, which consist of $7,000,000 5 per cent. bonds and $3,500,000 6 per cent. on cumulative preferred, and $3,500,000 common stock, will be distributed to holders of reorganization certificates in a few weeks. Of the bonds, $1,500,000 will be placed with a trustee, to provide for underlying lines on a portion of the property.

**New York City.**—The Fulton Street Railroad Co. has bought the equipments and franchises of the North & East River Railroad from John H. O'Rourke, of Brooklyn. This road extends across the city, through Fulton street to West street, to the Chambers street and Cortlandt street ferries. It is supposed that the purchaser represents the Metropolitan Traction Co.

President Vreeland, of the Metropolitan Traction Co., has recently issued the following statement of the receipts of the road for the nine months from April 1 to Dec. 31:

| | |
|---|---|
| Gross receipts | $5,320,256 |
| Operating expenses | 2,714,927 |
| Net receipts | $2,605,329 |
| Other income from dividends and rentals | 242,394 |
| Total | $2,847,723 |
| Fixed charges | 1,707,882 |
| Net | $1,139,841 |
| Dividends paid at rate of 5 per cent. per annum | 1,038,737 |
| Net surplus | $101,104 |

The Metropolitan Company owns 164 miles of track, 25.34 miles of which are operated by cable, 6.78 miles by underground electricity, and 131.38 miles by horses. Of the net earnings, more than 73 per cent. came from the lines using mechanical traction. When horses were used on all the lines the working expenses were 70 per cent. of the gross receipts; the substitution of the cable on Broadway reduced the working expenses of that line from 66 to 38 per cent., and of the entire system to 54.39 per cent.

**Pittsburgh, Pa.**—The Westinghouse Electric & Mfg. Co. recently shipped two electric generators to the Nassau Electric Railway Co., of Brooklyn. These motors, which are of 1,500 H. P. each, are of the style known as the engine type, being direct connected to a Cooper-Corliss engine running at a speed of 75 revolutions a minute, and are some of the largest that have ever been made for running an electric road.

**Youngstown, O.**—Judge Gillmer has decided that the franchise of the Youngstown Park & Falls Electric Railway Co. is invalid, as the company was not the highest bidder for it. A. A. Anderson presented a bid offering to sell 29 tickets for $1, while the Park & Falls Co. only offered 24 for $1. The Youngstown Electric Railway Co. also enjoined the former company from crossing its tracks. The court also sustained this injunction.

## TRAFFIC.

### Traffic Notes.

The members of the Louisville Car Service Association have voted to discontinue the Association March 1. It is said that the Louisville, Evansville & St. Louis refuses to longer conform to the regulations of the Association.

The Secretary of Agriculture has issued an order changing quarantine regulations in the southwest, and the cattlemen of Texas claim that the new rules are too strict; that they will prevent the shipment of cattle from Texas northward, except for immediate slaughter, from Feb. 15 to Nov. 15.

The resolution of the managers of the Joint Traffic Association to abolish the payment of cartage by railroad companies for transportation of freight between freight houses and stores, seems to have aroused a good deal of excitement at Detroit and Lansing. It would appear, from accounts in the local papers, that free cartage has been provided by the Grand Trunk in these cities for many years and the discontinuance of the custom has aroused strong opposition. It was reported that after a few days' suspension the teams were again put on, but whether this means that freight coming under the Joint Traffic agreement is now carted free, does not appear.

### Chicago Traffic Matters.

CHICAGO, Feb. 11, 1896.

Encouraged by one season's success in ferrying loaded cars 300 miles from Northern Michigan to South Chicago, the Lake Michigan Car Ferry Transportation Company has leased the docks and warehouses of the North Michigan line at the head of Lighthouse Slip, Chicago, and will, on April 1, enter into competition with the all-rail lines for local Chicago business. Cars will be towed on lighters to South Chicago, and thence on the big boats to Peshtigo.

At a recent meeting of the trans-Missouri lines in Chicago the Rio Grande Western agreed to come into the Western Passenger Association and it was voted to extend the territory of this organization to cover Colorado and Utah. The Denver & Rio Grande and the Colorado Midland were not represented at the meeting but is believed that they will come into the association now that the Rio Grande Western has done so. At the same meeting it was unanimously agreed to withdraw ten-ride party tickets from sale Feb. 11. These tickets are now abolished in the territory west of Chicago, east of Salt Lake City, south of St. Paul and north of the Texas state line. Among other things agreed to at this meeting was the formation of local passenger associations at Denver, Pueblo, Colorado Springs and other western points.

C. G. Freeman, a produce dealer of Cadillac, Mich., charges a number of Southwestern roads with discriminating against him on freight rates to Texas. The Central Traffic lines draw a line through Cleveland, Detroit and Grand Rapids, north of which no through rates are made to Texas. Cadillac is north of this line and Freeman says he is forced to pay the sum of the locals. He directs his charge against the Western roads, which in their answers say that the complaint should be made against the Central Traffic lines, which make and quote the through rates. The Interstate Commerce Commission will hear the case in Chicago Feb. 20.

The Chicago, Rock Island & Pacific has for sometime been using the old fashioned season suburban ticket, which has no coupons and requires no punching, and which allows the holder to make an unlimited number of trips during the month for which the ticket is issued. It is said that the officers of the road regard the results as satisfactory, the tickets "tending to popularize suburban travel," and therefore to increase the population of these towns.

To meet Canadian Pacific competition the Chicago-St. Paul lines, in connection with the Chicago & Grand Trunk from Chicago, have put in effect a 25-cent. rate on grain from St. Paul to Boston and common points. This is a reduction of five cents per 100 lbs. So far as can be learned, this tariff is not authorized by the Joint Traffic Association, and the Grand Trunk seems to be acting under the old agreement of the eastbound roads, allowing it to meet Canadian Pacific competition. The other eastbound roads are somewhat anxious over the matter.

In accordance with a resolution of the Board of Managers the Eastbound roads have agreed to make a maximum allowance of $2.50 a car on oats and $1.50 on other grain for transferring the same from elevators in Chicago and at outside junction points. This will apply only to through-billed grain. These allowances are somewhat below those of the Michigan Central and Wabash, but the agreement is said to be satisfactory to all lines.

Chicago-St. Paul lines have united in a request to their St. Louis connections to stop the sale of second-class tickets between St. Louis and St. Paul, via Chicago, claiming that they are extensively scalped in this city, demoralizing the first-class rates between Chicago and St. Paul. The tickets are sold at $13 50.

Eastbound shipments last week aggregated 80,078 tons, as compared with 79,362 tons the previous week, and 67,532 tons last year. The Erie carried 14,206 tons, the Chicago & Grand Trunk, 9,472 tons; the Fort Wayne, 8,899 tons; the Michigan Central, 8,463 tons; the Lake Shore, 8,316 tons; the Wabash, 7,432 tons; New York, Chicago & St. Louis, 7,233 tons; Baltimore, Ohio, 6,815 tons; the P. & C., C. & S. L., 5,774 tons, and the C., C., C. & St. L., 3,466 tons.